THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW.

OLD SERIES. Vol. 21. No. 5. NEW YORK, MAY, 1915. NEW SERIES. Vol. 13. No. 5.

DAYTON, OHIO, THE ELECTRO-PLATERS' 1915 CONVENTION CITY

THE PLACE WHERE ALL PERSONS INTERESTED IN ELECTRO-PLATING SHOULD GO JUNE 3-5, 1915.

BY WALTER FRAINE.*

The location of Dayton, Ohio, in the heart of the fertile valley of the Great Miami and at the junction of the Mad River and the Stillwater, which unite at this point to form the Great Miami, was largely determined by nature. Existing conditions of transportation, which at that time were largely confined to "rowboat" waterways, fixed the trading point for this fruitful valley at the junction of these streams.

Purely inland, and possessed of no resources other than agricultural, Dayton has at no period of her history experienced abnormal growth. Her growth, however, has been steady and constant and today Dayton ranks as the forty-third city in the country in point of population.

Founded in 1796, the population in 1810 was 383, in 1910 it had increased to 116,577 and in 1915 to 132,000 (estimated). This increase is the resultant of improvements in transportation facilities and the urbanizing tendency of the rural population and also her central location in regard to the density of population of the country. Located just across the State line from the center of population of the United States, the principal markets of the country are within five hundred miles of Dayton, and more than one-half of the population of the country reside within the same radius.

These factors have attracted many and varied industries to Dayton, and now Dayton's pre-eminence as an industrial city has made it known far and wide as "The City of a Thousand Factories." Dayton's factories turned out approximately $90,100,000 worth of products in 1914. This makes an annual per capita output of $728.00. Fifty new manufacturing concerns were added to the list during the year 1914. The variety of Dayton's products are exemplified by the following concerns, all of which are located in Dayton, and are the largest in the world in their particular lines:

THE NATIONAL CASH REGISTER COMPANY'S PLANT AT DAYTON, OHIO, WHERE THE 3RD ANNUAL CONVENTION OF THE AMERICAN ELECTRO-PLATERS' SOCIETY WILL BE HELD JUNE 3-5, 1915.

DAYTON'S WORLD LEADERS.

Aeroplanes—The Wright Co.

Airless Automobile Tires—The Dayton Rubber Mfg. Co.

Autographic Registers—The Egry Register Co.

Automatic Toys—Dayton Friction Toy Works.

Automobile Lighting, Starting and Ignition Sys-

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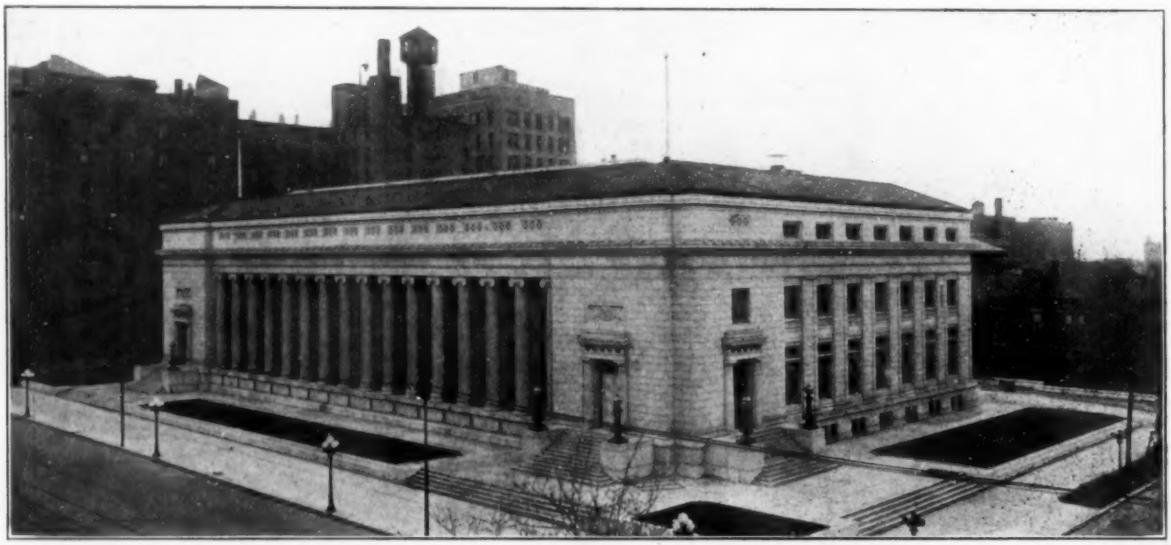
tems (Delco)—The Dayton Engineering Laboratories Co.
Bicycles—The Davis Sewing Machine Co.
Bookbinder's Machinery—The Seybold Machine Co.
Cash Registers—The National Cash Register Co.
Cast Iron Vases—The Kramer Foundry Co.
Cement Tools—The C. W. Raymond Co.
Clay Working Machinery—The C. W. Raymond Co.
Clothing (White Duck)—The Roehm-Richards Co.
Collections—The International Law & Collection Co.
Computing Scales—The Computing Scale Co.
Electrolytic Bleaching Machines—National Laundry Co.
Fare Recording and Indicating Registers—The Ohmer Fare Register Co.
Fine Cut Tobacco-Cutting Machinery—The Buckeye Iron and Brass Works.
Golf Clubs—The Crawford, McGregor and Canby Co.
Hoisting Jacks—The Joyce-Cridland Co.
Paper Trimming Knives—The A. A. Simonds and Son Co.

Electric railway lines	8
Steam railway lines	6
Roads operating—	
Trunk lines	4
Short lines	2
Schools—	
Public	42
Parochial	14
Churches, of all denominations	110
Hotels	36
Assessed valuation, actual	$866,831,000.00
Post office receipts	736,477.00
Bank clearings, 1914	115,479,339.14
Jobbing trade, 1914	21,901,447.00
Factory output, 1914	90,097,934.00
Building and loan societies	18
Depositors	50,000
Deposits	$30,000,000
Rank	43

Dayton is a large publishing center. Fifty-one publications, with a combined circulation of over a million, are entered as second class mail matter in the Dayton post office. Many of these publications are notable in their respective fields. In religious periodicals particularly, Dayton ranks high. These periodicals carry the Dayton imprint to all nations of the earth.



POST OFFICE AND FEDERAL BUILDING, DAYTON, OHIO.

Price Marking System Machines—The Monarch Tag Co.
Sealing Wax for Fruit Jars—The Dicks-Pontius Co.
Sewing Machines—The Davis Sewing Machine Co.
Shoe Lasts—The Crawford, McGregor and Canby Co.
U. S. Navy Air Compressors—The Platt Iron Works.
U. S. Stamped Envelopes—The Mercantile Corporation.
U. S. Stamped Envelope Paper—The Aetna Paper Co.

It is customary to think of statistics as dry things. The very name frequently is enough to frighten away the casual reader. But comparative statistics are as necessary for a correct analysis of a city, its industries, its trade and its growth as an inventory and a balance sheet are for a successful merchant. The following statistics are of interest:

FACTS ABOUT DAYTON.

Founded	1796
First government	1805
Incorporated	1816
Population	132,000

Besides being notable for the variety and extent of its industries, Dayton is also a city of homes and its wide and gently sloping streets, bordered by well kept lawns, have given it the dual name of "The most beautiful inland city in America." The boulevard lighting system in the business districts is second to none. The general character of the handsome residential district is indicative of great thrift. The houses are artistic, well spaced and set back from the streets, thus giving light and air to all. In the percentage of ownership of homes, according to the figures recently issued by the Bureau of the Census, Dayton ranks fourteenth, which is considerably ahead of her position as compared with population. Thirty-eight and one-tenth per cent. of the population own their own homes. Numerous boulevards and small parks furnish breathing places. Playgrounds and gardens are established, and a well thought-out and constructive plan ensures sufficient additional improvements for the future along this important line.

Educational facilities are ample, the Dayton school system of fifty-six public and parochial schools having a reputation for thoroughness and efficiency throughout the country. One hundred and ten churches of all denominations indicate that the citizens of Dayton are in favor of moral living, and that they are thrifty is shown by the number of individual home owners and the fact that Dayton has more prosperous building and loan societies than any city of its size in the country.

POLITICAL DAYTON.

Founded in 1796, its first government was organized in 1805, the town was incorporated in 1816, and remained under the federal form of government until 1914, when the form of government known as "the Dayton plan" was started. The "Dayton plan" as distinguished from the "Des Moines," "Galveston" and other plans, requires the services of an expert manager to administer and a commission to legislate. The commission is elected by the people, and as a body choose the manager, who in turn selects the heads and subordinates of the various executive departments of the city government.

The plan is unique in that the manager does not have to be a resident of Dayton, but may be secured from anywhere, the one qualification being that he must be an expert, skilled in municipal government. He is directly responsible to the commission and can also be recalled by the electorate. Other features of the new charter, which mark this as the most democratic and progressive form of government in the United States are a non-partisan ballot, the initiative, referendum, recall and protest.

CONVENTION CITY.

Scarcely a more favorable point can be found for holding a convention than Dayton. Delegates and visitors will be able to attend at the minimum average cost for transportation. More than one-half of the population of the United States reside within 500 miles of Dayton. Very likely this is also true of the membership of every national organization.

MARKET DAY, MAIN STREET, LOOKING NORTH, DAYTON, OHIO.

Dayton is neither too large or too small for an ideal convention city. Dayton has all the hospitality and the enthusiasm of a small city, with all of the conveniences and accommodations of a world metropolis. Six railways, converging from all points of the compass lead to Dayton. These are the Big Four, Pennsylvania, Cincinnati, Hamilton and Dayton, Erie, Dayton, Lebanon and Cincinnati, and the Dayton and Union. The Union station is within a block of the main business district.

HOTELS.

Thirty-six hotels offer hospitable entertainment to the visitor or convention delegate. Rates are moderate and rooms may be secured on either the American or

European plan. In addition there are a number of boarding houses that open their doors at times when unusually large delegations, such as have been handled several times in the past, meet here. The Y. M. C. A. and Y. W. C. A. buildings, their cost aggregating over $1,000,000, are also available for the entertainment of visiting members.

CONVENTION HALLS.

Dayton is well equipped for holding conventions. Memorial Hall is the principal auditorium, seating 4,000. It has an enormous stage and is equipped with a modern heating and ventilating system, dressing rooms, etc. There is also a large lower floor, with a kitchen attached, that may be used for banquets or exhibition purposes. In addition, there are several smaller auditoriums, such as the Y. M. C. A. and Y. W. C. A. buildings, that may be secured for meetings attended by one thousand or less.

There are many forms of amusement for the convention visitor in Dayton. An even dozen theaters are to be found in the heart of the city and several amusement parks are within easy reach by trolley lines. Fairview Park Theater is the summer home of a high class stock company. Lakeside Park is equipped with all the appurtenances that go to make up the modern amusement resort.

The finest natural private park in America is located in Dayton. It is owned by Mr. John H. Patterson and lies just south of the Dayton city limits, easily accessible by car line. "Hills and Dales" has 1,100 acres of rolling woodland, traversed by winding automobile roads and bridle paths. It is open to the public at all times.

PLATING DEPARTMENT, DAYTON ENGINEERING LABORATORIES COMPANY (DELCO), DAYTON, OHIO.

THE AMERICAN ELECTRO-PLATERS' SOCIETY'S CONVENTION.

The third annual convention of the American Electro-platers' Society will be held at the factory of the National Cash Register Company, Dayton, Ohio, on the third, fourth and fifth of June, 1915. The business sessions will be held in their Hall of Industrial Education, and the Round Tables in the evenings will be held at the Algonquin Hotel, which has been selected as headquarters. A number of excellent papers have been prepared for discussion at these sessions. The convention is to be an open one and all who are interested in electro-plating in any way are invited to attend.

THE EXHIBITION.

The exhibit of samples of work and of equipment and supplies by the supply houses will be in the rotunda of the Hall of Industrial Education, and dealers who may wish to make a demonstration of supplies or equipment will be furnished with space and facilities in the plating department of the National Cash Register Company.

It is the intention to make the exhibit one of the features of the convention, and the committee suggests that everyone bring samples of their work or product, and write Mr. A. Lamoureux, 500 East First street, Dayton, Ohio, chairman exhibit committee, stating the amount of space required and space will be reserved.

Mr. Lamoureux also says that all that is necessary is for intending exhibitors to consign goods to the National Cash Register Company for the American Electro-Platers Convention at Dayton, Ohio, and they will be taken care of. He urges all who wish to put in an exhibit to correspond with him at once so as to allow ample time to arrange matters.

Conditions for housing the convention at the N. C. R. plant are ideal. A magnificent chemical and physical research laboratory and a splendidly equipped electrical laboratory, along with the largest and one of the best plating rooms in the country will be open to the inspection of the delegates and visitors to the convention. Nowhere else in the United States could be found a place where the activities of a convention of this kind be so well centralized or where so much of interest to the electro-plater be found under one roof. Arrangements have also been made with some of the leading manufacturers to open their plants for the inspection of those attending the convention.

Rooms at the hotel may be secured at from $1.50 per day up, without bath, and $2.50 per day up, with bath. The committee suggest that delegates and visitors reserve their rooms in advance, if possible.

A "Seeing Dayton" trip and a visit to Hills and Dales, the most beautiful private park in America, will afford a pleasant break in the work of the convention. Nothing has been left undone by the committee in charge to make the convention both pleasant and profitable to all who attend. The convention will close with the annual banquet at the Algonquin Hotel, Saturday evening, June 5. The programme follows:

PROGRAM.

THURSDAY, JUNE 3.

Registration.—Hall of Industrial Education, N. C. R. Company.

10:00 a. m.—Opening session. Report of credential committee. Introduction of delegates. Annual address by the president.

2:00 p. m.—Business session. Reports of officers.

8:00 p. m.—Round table papers, addresses and discussions.

FRIDAY, JUNE 4.

10:00 a. m.—Business session.

2:00 p. m.—Business session.

8:00 p. m.—Round table papers, addresses and discussions.

SATURDAY, JUNE 5.

9:00 a. m.—Business session, election of officers, choosing next convention city.

THE ALGONQUIN HOTEL, THE HEADQUARTERS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY CONVENTION, JUNE 3-5, 1915, DAYTON, OHIO.

7:00 p. m.—Annual banquet.

The convention committee announces that it has been decided to place the convention on a business basis by charging the delegates and visitors a small sum to cover banquet and entertainment expenses. They state that in doing this that they are following a precedent set by all the larger associations, such as the American Foundrymen's Association, etc., and in view of the fact that almost all future conventions must be staged by the smaller branches of the society, and the expense, if borne by them entirely, would bankrupt them, have caused the Dayton committee to take this action and form a precedent which other branches may be glad to follow in the future.

PREPARATION AND OPERATION OF ALL LEAD PLATING BATHS

By Frank C. Mathers.*

An Exhaustive Resumé of the Literature Relating to the Electro-Deposition of Lead.

The most important thing in lead plating is the use in each bath of the proper "dope" or addition agent which overcomes the tendency of lead to deposit as loose, feathery crystals. At the present time no addition agent is known (molasses has been recommended) which will give good deposits from alkaline lead baths, consequently those baths made by dissolving lead acetate or other lead salt in sodium or potassium hydroxide are of no value. The lead is deposited either in a feathery crystalline condition or as a black loose sponge and the anodes do not corrode or dissolve readily. Time spent on these alkaline baths is wasted.

LEAD FLUOSILICATE BATH.

The fluosilicate or Betts bath[1], which is the best known lead plating and refining bath, varies in composition but 13 ounces of lead fluosilicate, 11 ounces fluosilicic acid and 0.026 ounces of glue in a gallon of water will give good results. The bath is worked at a current of 12 amp. per square foot and a voltage of 0.3. A less concentrated bath, hence a cheaper bath to prepare, must be run at a lower current. On account of weak reagents or errors in preparing the bath, its concentration may be less than supposed, consequently, if crystalline deposits are obtained, the current and voltage should be lowered. If this does not overcome the trouble, a little more glue should be added, but an excess of glue *must* be avoided otherwise the deposit will become black and spongy. The effect of the glue is very important and some glues give poor results under all conditions of working. A good quality of glue should be tried, then, if a smooth, firm, finely crystalline deposit is not obtained, an entirely different sample of glue should be tried. There is no known method of determining the fitness of a glue sample except by actual test. More glue must be added at the rate of 0.1 ounces for each 10 pounds of anodes that dissolve. Some experiments have shown that a few drops of clove oil may be added to the bath in the place of the glue; the very great advantage being that an excess does not injure the bath, although an excess should be avoided, because the oil floating on top of the solution fouls the work as it is being put into the bath.

The best method of preparing the fluosilicate bath is as follows: An excess of clean white sand or crushed quartz is added to 35 ounces of 40 per cent. hydrofluoric acid[2] in a lead, hard rubber or wooden vessel (glass or porcelain cannot be used). Frequent stirring and the use of an excess of sand, even enough to cover the acid, hastens the reaction which is complete when a small portion added to a lead acetate solution produces no precipitate or only a slight one. If the reaction is not complete in 4 or 5 hours, the mixture should be warmed (140° F.). The solution is then filtered from the sand, which is washed with water until the washings do not redden litmus paper, and 10 ounces of white lead are slowly added, with stirring until the evolution of gas ceases. The solution is ready for use after adding the glue, dissolved in a little warm water, filtering and diluting to a gallon.

LEAD FLUOBORATE BATH.

Lead fluoborate and fluoboric acid[3] may be used in place of the lead fluosilicate and fluosilicic acid, as described above. The bath is much easier to prepare and is slightly more expensive than the fluosilicate, but a higher current can be used. The bath is made as follows: Boric acid (six ounces should be enough) is added slowly with constant stirring to 35 ounces of 40 per cent. hydrofluoric acid as long as the boric acid dissolves. The reaction takes place vigorously and quickly, hence delay, as encountered in preparing the fluosilicate bath, is avoided. Ten ounces of white lead is then added with constant stirring as long as gas is evolved. The solution is filtered and the glue (0.026 ounces), dissolved in warm water, is added. This solution after diluting to a gallon is ready for use as directed under the fluosilicate. This bath has a composition of about 15 ounces lead fluoborate and 8 ounces of fluoboric acid per gallon.

PERCHLORATE BATH.

The lead perchlorate bath[4] is the most permanent, most easy to operate, gives the smoothest deposit at the highest current and does not attack glass or porcelain. A good composition is 13 ounces lead perchlorate, 4 ounces perchloric acid and a few drops of clove oil in a gallon of water. A current of 18 amperes per square foot may be used.

Perchloric acid for making the bath may be most easily prepared[5] by treating 14 ounces of sodium perchlorate[6] with 25 ounces of concentrated hydrochloric acid, stirring for a few minutes, filtering through glass wool, asbestos or felt and washing the residue with a few portions of concentrated hydrochloric acid. The filtrate is evaporated until white fumes are evolved. Another very convenient method[7] of preparing the perchloric acid is as follows: To a vigorously boiling mixture of 12.5 ounces ammonium perchlorate, 15 ounces water and 10.25 ounces concentrated nitric acid, add, through a long-stemmed funnel, 2.6 ounces concentrated hydrochloric acid previously diluted to 12 ounces with water. The total time of adding the acid should be 25 minutes. Water is added to replace that lost by evaporation and the boiling is continued for an hour. The solution is then boiled down until heavy white fumes begin to be given off. The per-

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[1] U. S. P., 679, 824 and 713, 277.
Met. Chem. Ind., 1, 407 and 105 (1903).
Elect. Review, 43, 288 (1903).
Trans. Am. Inst. Min. Eng., for 1903.
Jahr. Electrochem., 8, 543 (1902).
Betts, "Lead Refining by Electrolysis," Wiley & Sons.
Eng. and Min. Jour., 74, 475 (1902).
Mines and Minerals, January, 1905, and September, 1910.
Western Chem. and Metall., May, 1907.
Chem. Eng., 13, 29 (1911).
Metallurgie, 6, 233 (1909).

[2] Hydrofluoric acid, if spilled upon the skin, must be washed off instantly with water, otherwise a very severe burn will result.

[3] The Betts' patents broadly cover the use of "fluorine acids."

[4] U. S. P., 931, 944, to Mathers.
Trans. Am. Electrochem. Soc., 17, 261 (1909), and 21, 332 (1912).
Chem. Ztg., 1316 (1910).
D. R. P., 223,668 (1909), and French Pat. 419,769 to Siemens & Halske.

[5] Jour. Am. Chem. Soc., 32, 66 (1910).

[6] A quotation upon sodium perchlorate before the war was 11 cents per pound f. o. b. New York, to be imported.

[7] Jour. Am. Chem. Soc., 34, 1480 (1912).

chloric acid prepared by either of these methods is allowed to cool, is diluted with some water and is treated with 7.5 ounces of lead oxide (litharge) or 8 ounces of white lead and a few drops of clove oil. After the litharge or white lead has dissolved, the solution is filtered, diluted to a gallon and used. More clove oil must be added occasionally while operating the bath, but an excess should be avoided because the film of oil on the surface will foul the work as it is being placed in the bath. An excess of clove oil has no injurious effect upon the bath.

LEAD ACETATE BATH.

Lead lactate, formate or acetate may be used, but the latter[8] being cheapest is recommended. The bath is prepared as follows:

The extract obtained by boiling 7 ounces of unleached yellow poplar sawdust in a quart of water for 15 to 60 minutes is added to a solution of 13 ounces lead acetate, 6 ounces ammonium perchlorate and 7 ounces concentrated acetic acid. Other woods than yellow poplar may be used, but the list has not been worked out yet. Ammonium perchlorate, sometimes troublesome to obtain from supply houses, can be substituted by 3 ounces of potassium perchlorate and 3 ounces ammonium acetate; although the deposit is less good, this bath is recommended as the best, easily prepared cheap lead solution. The most serious objection to the bath is that the deposits when thick, say above 0.01 inch, are brittle and show cracks if the work is severely bent. Another objection is that the bath, after it has been in operation many weeks, tends to give spongy black deposits. This trouble can be overcome to a large degree by the addition of more acetic acid and more of the poplar wood extract. A current of 3.7 amperes per square foot at a voltage of 0.4 is used.

LEAD NITRATE BATH.

The simplest and cheapest lead bath[9] contains 13 ounces lead nitrate, 7 ounces concentrated acetic acid and 3 ounces of the gummy residue remaining from the commercial extraction of aloes in the manufacture of aloin. This gummy residue is dissolved by warming in the acetic acid and is then added to the lead nitrate previously dissolved in a gallon of water. The bath is used without filtering. A supply of the aloes residue was furnished to the writer by Sharp and Dome, manufacturing chemists, Baltimore. Crude aloes, which drug stores generally carry in stock, may be treated with warm water and the insoluble residue used as described above. The aqueous extract itself may be used with fair results, but the residue is much the best. About 4 amperes per square foot at a voltage of 0.35 may be used. The only serious objection to this bath is that after seven or eight weeks it decomposes or deteriorates so that the deposit becomes spongy. No way is known of overcoming this trouble. If the deposit merely becomes rough more acetic acid should be added and the solution should be warmed for a short time. The addition of new solution to these baths to replace that removed with the goods will largely avoid the trouble with the deterioration of the bath. The deposits are nice and smooth, but brittle when thick.

PRECAUTIONS IN THE OPERATION OF LEAD BATHS.

1. The solutions should be kept strongly acid. This is absolutely necessary in the baths containing fluorine to avoid serious decomposition.

2. The anodes should be placed in closely woven cloth bags to prevent slimes and solid impurities floating to the cathodes and producing rough places on the deposits.

3. The anodes may be suspended by copper wires reaching into the solutions since copper is not attacked as long as it is in contact with lead.

4. The composition of these baths may be varied a good deal with very little effect upon the deposit except that, in every case, the more dilute the bath the lower the current which can be used.

[8] Trans. A. Electrochem. Soc., 24, 315 (1913), and 25, 99 and 117 (1914).

[9] Trans. Am. Electrochem. Soc., 25, (1915).

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BRONZE GROUP OF ART, SCIENCE AND HISTORY.

This statue, by Julia Bracken Wendt, was recently unveiled in the main rotunda of the Museum of History, Science and Art, at Exposition Park, Los Angeles, Cal.

The practical purpose of this monument is to light the rotunda, hence "Light" furnished the theme to the sculptor. Light of truth, uplifted, and brought forth by these three exponents of Human Endeavor, History, Science, Art; represented by as many draped figures, holding a huge glass globe. The monument is 16 feet high.

The statue was cast from the sculptors model by means of the lost-wax process as described by W. N. Nelly in his article on THE ART OF MOLDING AND CASTING A MONUMENT which was published in the March issue of THE METAL INDUSTRY.

BRASS FOUNDRY EQUIPMENT AND MANAGEMENT

SOME COMMON SENSE REMARKS BY AN EXPERT FOR THE BENEFIT OF THE TRADE.

BY W. H. PARRY.*

(Continued from February.)

In making a selection of a sand blasting machine there are a few points to consider that enter into their successful operation. The cylindrical shaped barrels that revolve very slowly and use from two to six nozzles are fairly economical in the use of air, the amount used depending on the number and size of openings of the nozzles. For small work this class of machine fits in nicely and the fit will be a whole lot better if you don't overload them, for it is much better practice to thoroughly clean a fair amount of castings than half clean a larger quantity.

There are sand blasting machines of a type known as the "oblique" that rotate in a plane of forty-five degrees. It is claimed for this type that the castings are not bruised in any way and by reason of the peculiar form of the shell are constantly presenting new surfaces to the cutting action of the abrasive used. They do all these things and they do something else that the makers do not mention and that is they are enormous consumers of air unless you can get compressed air for nothing, nix on this type.

The machine with the table revolving in a horizontal plane is the goods on pretty nearly all kinds of work and if one is not too particular as to how many particles biff the operator on the weak spots of his anatomy, then this is the machine. Before bidding the sand blast machines a fond adieu, we warn all prospective users of any of them that they must be prepared to have slathers of power at their disposal, as it frequently happens that the salesmen who, by their wiles ensnare a buyer, forget to mention that between supplying lots and lots of air and the force necessary to keep these machines in motion that from twenty-five to fifty horsepower is consumed to operate one machine, but if you have enough work to keep things going all the time it pays at that.

CORE MAKING MACHINES.

If your business is such that a great amount of core work is necessary to produce the castings it would be well to consider the installation of core-making machines. There are four types on the market and all of them good.

The machine that operates very much as a meatchopper does, can be used to advantage on round, oblong or square cores of almost any desired length. In fact, this machine is limited only to the size and shape of the die or former as the length can be anything that the carrying plates are. The same is true of the plunger type in every respect, but the greatest drawback in the use of either of these types is the wearing of the dies by the lapping action of the sand passing through them, thus requiring a very frequent renewal of dies.

The jolt ramming core machine on medium and heavy cores is a winner all over, and its strong point is that any core-box can be literally thrown on the machine and the core made in "three shakes of a lamb's tail." Light cores, in multiplex core-boxes, can be made on this machine to advantage and for all around good work the jolter is a "pippin." They are made to operate with compressed air and by cam action, electrically driven, so that if you are fitted up either way the machines are on the market and ready to deliver the goods.

The fourth make of machine is an expensive affair in its initial cost, for before you are through installing it a thousand dollars will look sick, but if you have the work for it there is no greater machine on the market for making cores, as it shoots the core-sand into the core-boxes eight times a minute and automatically vents each core while making it. This is going some and when you consider that the core-box is clamped, filled and released in one-eighth of a second, and most any old core-box at that, you must realize that it is easily the greatest core machine on the market.

CORE-BINDERS.

There are many core-binders sold today and all of them have some virtue, even if it is only that they smell good, and if there are any foundrymen so dense that they cannot find a core-binder that will fill the bill, then it's "good night" for his. There are binders both in powder and liquid form that are sold so cheap that one wonders if the firms engaged in the manufacture and the marketing of these goods are doing it out of pure philanthropy or because they like to lose money.

For some cores, flour is a very good binder, and again for others it is useless. Taking it all in all, linseed oil is admitted to be the very best binder for all around work and cheap enough, if handled properly. It is considered, by the best of authorities, as vastly superior to flour, yet there are a few old hide-bound foundrymen who stick to flour, notwithstanding the fact that a core made with flour as a binder cannot be forced into the core-box where it was made, after the core has been baked. So it would seem as if the flour binder advocates had missed their vocation and would be better employed running a bread bakery, specializing in the making of five cent loaves to sell at six cents to a starving populace.

MOLDING AND CORE-SANDS.

There are numerous molding sands well adapted to brass foundry work, such as Albany, Lumberton, Riverside, Conneaut, Zanesville, Newport, and for very fine work, Windsor Lock.

Sands that can be used for the making of cores are confined only by the limits of this mundane sphere and vary in fineness from Windsor Locks to pebbles and to attempt to enumerate them would take several pages of this monthly. The essentials in good core-making being a smooth surface and perfect venting, though these two are rarely found in any one core. The placing of fine sands nearest the core-box and then filling in with a much coarser grade will at times produce good work and then again it won't. The best that can be said of core-making is to experiment with sands, binders and the necessary heat and once you hit the successful combination, stick to it like a hungry dog to a beefsteak.

(To be continued.)

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BOLIVIAN MINERAL PRODUCTS.

A list provided by the chamber of commerce and by the Bolivian Government of this country's metal products included: Tin, copper, bismuth, wolfram, silver, elastic rubber, and hides. For the last three years Bolivia has been producing about one-fifth of the world's total output of tin, its exports of this article being about 25,000 tons per year.

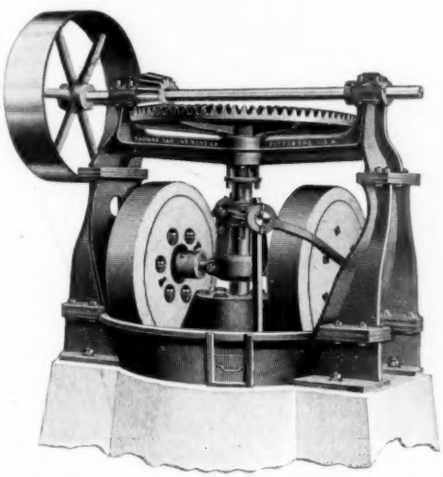
THE TREATMENT OF BRASS FOUNDRY SWEEPINGS*

A Description of a Practical Method for the Recovery of the Metal Contents of Casting Shop Refuse.

By A. W. Lemme.†

Mr. President and Gentlemen of the Chicago Foundrymen's Club:

Upon the request of Mr. Larson, chairman of the Educational Committee, and in accordance with Bulletin No. 25, I submit to you a short paper on the subject of "Reclaiming of Brass Foundry Sweepings." This idea occurred to Mr. Larson through a conversation held after a meeting of this club some six weeks ago, when the very interesting discussion of briquetting iron borings, melting iron borings, etc., took place. Mr. Larson, ever alert to the educational wants and needs of the club, nailed me to the cross immediately upon learning that I had a similar proposition connected with my position, and asked me to prepare a paper on the subject of "Melting Tailings from our Brass Foundry Refuse"; however, the subject to be covered tonight, as announced in your bulletin, is a more complete one than that mentioned by Mr. Larson. So I will endeavor to touch upon what constitutes brass foundry sweepings, how they are accumulated, and the process of reclaiming them.



CINDER CRUSHER MADE BY THOS. CARLINS SONS COMPANY, PITTSBURGH, PA.

It must be borne in mind by those present that this subject, so far as our company is concerned, is a very large and vital one. With a melting capacity of about 100,000 pounds of metal per day, using two cars of coke a week, one car of fuel oil every ten days, and about 80,000 pounds of molding sand per month, our refuse accumulates to the extent of 12,000 to 15,000 pounds a day, and in accordance with the occupational Disease Act we are not allowed to sweep any floors during working hours. Therefore, it is necessary that we perform this duty at night, and inasmuch as we sweep our foundry and clean the plant in general by unskilled labor, we have found that the cheapest way is to dump the refuse in one pile in the back yard and pick out the largest pieces of metal by hand. We then put the rest through a large screen of 1-inch mesh, and that portion of the refuse which goes through the 1-inch mesh is put through a crushing process.

The crusher we have installed was purchased from the Thos. Carlins Sons Company, Pittsburgh, Pa.; it is run by a 35 h. p. motor and is washed with a water process. The two wheels of the crusher are about 4 feet in diameter with a 10-inch face, weighing about 6,000 pounds each, running in a pan 18 inches deep and about 10 feet in diameter. The crusher is sunk in the floor, the top of the pan being on the floor level, making the feeding of the pan as easy as possible. We feed the pan some 30 minutes steadily, then stop the crusher and shovel the heavy brass out of the pan into a jig consisting of a 14-inch square pan with a brass screen of 100 mesh in the bottom. The water agitates through the screen and through the brass. The brass is then shoveled out and the iron picked out by hand. This brass product we term "washings" and it is used directly as a portion of our formulas.

Considerable fine particles of brass escape with the overflow of water agitating through the jig screen, and this overflow in conjunction with the overflow from the crusher pan is led into a pit where a Frenner sand pump is installed which automatically conveys this product to an Overstrom concentrating table. The jig, sand pump, and table are operated by a 5 h. p. motor, belt driven.

By these processes we find four separations of refuse usable:

1. The large pieces of metal separated by hand.
2. The washings.
3. The pieces that are too large to go through the 1-inch mesh.
4. The concentrate recovered by the Overstrom table.

The first two separations are used directly in our foundry practise; the third is used in our cupola direct, and the fourth, the concentrate which runs about 20 per cent. metal, is briquetted by using 90 per cent. concentrate and 10 per cent. of the very cheapest stucco we can buy (about $5 per ton, car load lots). We form our briquets by using the above formula, adding enough water to make the mixture a soft mud and shoveling it into forms where it sets quickly. Two men at 20 cents an hour make 300 briquets per 10-hour day.

In order to control the efficiency of the concentrating table we take a chemical analysis of our tailings, or the refuse after the concentrate has been separated. We find an average of .85 copper, representing 1.10 metal contents, and we analyze these tailings every 24-hour run. Washings recovered by the above process we find by chemical analysis about 85 per cent. metal, as follows: 77.00 copper, 12.00 lead, 7.00 tin, 4.00 zinc and impurities.

Washings are also analyzed daily.

As I have stated, the third and fourth separations of the refuse are treated in by cupola practise, the one used being a 24-inch water jacket cupola. Measuring from the bottom to the tuyer holes there is a straight wall 18 inches high and 24 inches in diameter, the slag hole being 6 inches above the metal hole. The cupola measures 10 feet from tuyer holes to charging door, and increases in diameter from 24 inches to 38 inches at the top. A 4-inch water jacket surrounds the cupola between these points. The only brick lining in the cupola is between the bottom and the tuyer holes. The blast is furnished by a 6-foot Connellesville positive pressure blower driven by a 7½ h. p. motor. We have experimented with pressure from 8 to 16 ounces, and we have found, in melting this low grade material, that a pressure from 12 to 14

*An address before the Chicago Foundrymen's Club, Chicago, Ill., April 10, 1915.

†Superintendent of Chicago Bearing Metal Company, Chicago, Ill.

ounces gives the best results, holding the water in the jacket at about 100 degrees Fahrenheit.

The charges are made up as follows:

Fifty pounds limestone, 240 pounds briquets, 380 pounds refuse, 100 pounds slag direct from cupola, 100 pounds coke, 2 buckets of water.

Capacity of the cupola is about five of the above charges per hour. The slag is tapped three times per hour and is held at a consistency of cream, not allowing it at any time to become sticky as it is absolutely necessary to keep the slag thin enough for the metal to flow through it freely; otherwise a large portion of the metal would be carried off with it. The slag is tapped into regular slag buggies used by smelters in general and is set aside to solidify before emptying. After being emptied each ball of slag is broken and inspected for metal, and we often find a good-sized nugget at the bottom. This shows, to our satisfaction, that the slag is thin enough to allow the metal to find its natural gravity.

A sample of the slag is taken by using a small Babbitt ladle and pouring a small portion into cold water once every hour, and one analysis taken on each 12 samples. We have found by this method that the sample is easily pulverized and dissolved. The average analysis is as follows: .97 copper, 43.50 silicon dioxide, 22.60 metallic iron. We generally take two taps of slag to one tap of metal, bringing down from 8 to 12 ingots weighing about 25 pounds each. One ingot is selected from each hour's run and a complete analysis taken from the drillings of 12 ingots, thereby taking two complete analyses to each 24-hour run. The average analysis is as follows:

82.00 copper, 8.00 tin, 7.50 lead, 2.50 zinc and impurities.

This little cupola has been run as long as 12 days and 13 nights without interruption. Great care must be taken in charging it, as the cupola is small and tapered and is very easily hung.

These installations are a combination of ideas gathered through personal experience and the experience of other manufacturing plants which I had visited in the East and Middle West previous to the installing of machinery throughout our new plant. For instance, the crusher used is a clay-mixing machine, while the jig, sand pump, and concentrating table are mining propositions. I realize that not many brass foundries accumulate such an amount of refuse, but hope that I may have said something that will lead them to grasp the importance of the reclaiming of brass foundry sweepings. It is well known that in a great many foundries the refuse will yield rich returns if properly handled.

LUBRICATING OILS IN THE METAL TRADES*

Some Practical Methods of Determining Their Value to the User.

By Dr. Fr. Wiessner.

The proper valuation of lubricating oil is a necessary condition for the quiet running of an engine as well as, in fact, for the rentability of an industrial enterprise. Recognizing this circumstance, the larger plants proceeded to subject the oils used in their factories to chemical analysis. Smaller and middle sized power plants which do not avail themselves of these expedients limit themselves to the statements of the supplier as to the quality of the oil, as they are not familiar with the processes for determining the value of the oil. The practice, however, has developed a series of rough tests, which enable everybody to ascertain the constitution of the oil in a certain and simple manner.

The most simple tests consists in allowing a drop of each of the oil samples to be tested to flow downwardly upon an inclined glass or shell plate and observing the behavior of the different drops. That oil which has traveled furthest downwardly and remains the longest fluid, is the most suitable. A somewhat more complicated test method consists in mixing the oil to be tested with an equal quantity of fuming nitric acid; if, after a few hours, the mixture is an almost compact mass with no fluidity at all, the oil can be considered as pure; but if the mixture remains fluid, the oil is impure and resinified. Another requisite for a good oil is that it should be as free from acid as possible. In order to determine the acid content, the sample of the oil is mixed with a small quantity of cuprous oxid or, if this is not at hand, with copper scale from a coppersmith's forge. If, after about 20 minutes, it does not show any change in color, it is free of acid, but a light greenish to blue-greenish coloration indicates a higher percentage of acid in the oil. If turbidity occurs still that does not necessarily constitute a proof of the low quality of the oil. Clouds may be formed in the oil as a result of an insufficient refining in the manufacture or through the use of unclean vats and casks; on prolonged undisturbed standing these compounds will soon settle upon the bottom. Impurities that can thus not be recognized at once, as, for instance, slimy substances of the cellular tissues left from the refining operations, are detected in the following manner: Approximately equal quantities of rape-seed oil and absolute alcohol are intimately mixed in a measuring cylinder by shaking and, before the alcohol has settled upon the bottom, the cylinder is held against the light. The slime particles are thereby rendered visible in the form of filaments slowly rising to the surface. If these slime particles are present in larger quantities there will be formed on top of the mixture a fine thin film which is especially conspicuous by its bright coloration. Other impurities are best determined by filtering through filtering-paper or cloth. The presence of lead compounds is readily ascertained by the addition of some sulphuric acid or soda to the oil. A white precipitate with sulphuric acid or a dark brown precipitate obtained with soda indicates the presence of lead. Cylinder oils should be examined with particular care, as they are liable to very seriously injure the pistons and cylinders of engines. A few drops of the sample are made to fall upon a polished plate of brass or copper. If, after five to six days, a bright light green colored precipitate is formed then the oil contains acids capable of injuring both piston and cylinder. An oil of good quality maintains its original color. The most reliable test is the following process: The piston is removed from the cylinder of the engine, both are rinsed with crude oil and then oiled with the oil to be tested. Likewise, the drop-lubricator is cleansed, fed with the new oil and the engine run for three to four days. If, on stopping the engine, the cylinder and piston are shown to be coated with a fine film of oil the oil can be considered fit for service. An oil which has been shown to possess a high degree of lubricity (oiliness) may be added to the engine for several weeks. The attempt is now frequently made to impart the necessary degree of lubricity to the oil by the addition of rubber. The best way to guard one's self against this adulteration consists in letting the oil fall in small drops. If it shows a tendency to form filaments that proves that it has been mixed with rubber. It is evident an oil containing rubber is not fit for use.

*Translated from "Chemische Apparatur" 1914, I, no. 24, p. 326.

KEEPING COST IN A JOB PLATING SHOP

SOME SUGGESTIONS FOR THE EFFECIENT PRODUCTION OF a VARIED LINE OF WORK.

By H. J. TER DOEST.*

The problem of keeping a cost account in the job plating business is very simple and does not entail much work that would be prohibitive. The system set forth in this article works very well for a shop employing as many as twenty-five men and has been used by the writer for seven years with very satisfactory results.

I will first explain what materials are needed. The first are some metal checks numbered consecutively from one up to as many as you think will be necessary for the work. The reason metal checks are used is because I found that paper got so dirty in the polishing department that the numbers could not be seen. Besides the metal checks can go on the wire and through the solution with the work and this will be found very convenient. The next materials needed are some time slips like the following sample, allowing enough space for eight or ten jobs.

Daily Time Slip

STAR PLATING WORKS

Akron, Ohio.....1914 Workman's Name.....

Job. No.	No. of Pieces	Hours	Minutes
	Total		

This is all that is necessary for just a cost account, but if it is desired to keep these cost accounts for future references so as to be a guide in bidding on work a book will also be needed for that purpose.

Now, give each workman a pad of time slips in order that he may enter all the time that he expects to get paid for, with the number of hours and minutes spent on each job. The slips should be kept in a small box on the workman's bench and the box should be provided with a cover in order to keep out the dirt. When a job comes in it is entered on the book as usual and then check number one is placed in with the job, and a note should also be made on the books that it is job number one. The job is then passed to the first workman who is to do work on it, and as each workman has to fill out his time slip he records the time spent on this particular job, and in the column marked "Job No." he puts one and so on through the shop until it is wrapped up and comes back to the office. When it reaches the office the time slips for job number one can be looked over and thus obtain the total time that was spent on the job and then reduce it to dollars and cents.

After obtaining the actual cost of labor, the cost of material and overhead expense should be added. This can easily be estimated as a certain per cent. of the wages paid the workmen. The cost of material in the buffing room is obtained in the following manner: Carefully watch how much tripoli, polish and buffs are used by the buffers for a given length of time and deduct from that how much it costs per hour. In the polishing room the same thing may be done with the emery, glue and wheels. The trial should cover about a month's time. In the plating room the same method should be pursued or, what is better, look over the last year's books and see how many hours the plater has worked and how much material he has used. Calculate from that how much the material has cost per hour. The determining the cost of materials can be done separately for each department or as a whole for all departments. If there should be a large amount of work that goes only to one or two departments it would be better to keep the material and overhead expense of each department separate and add it on the time of the workman of that department. For overhead expense you will at first have to go back in your books to see what this expense is, as no figures can be given because it will run from twenty-five to a hundred per cent., according to whether the shop is well equipped for the work at hand or is making shift and doing the best it can with what it has. In the latter shop it will possibly only be twenty-five per cent., while in the shop that is well equipped it may run as high as one hundred per cent., but in the shop that is well equipped the workman will do the work in less than half the time and consequently get it out cheaper and better.

If there is much silver and gold work to be done it is well not to add the cost of that work as a general expense, but to add the cost to the work on which it is deposited as the expense of this class of work varies greatly with the amount of previous metal that is deposited. It will be noticed on the time slip that there is a space marked "No. of Pieces." This is used to put down the number of pieces in the job and it also shows if the whole of job, Number One, was done in that time or only a certain number of pieces. This is important as the whole job is not always done at once and when the check reaches the office with the first installment of the job it must be returned to the balance of the work and not be used again on a new job until the first is completed. After the whole job is finished it can be used for another, as your books will show the date that it came in and went out and consequently only the time on the time slips corresponding with these dates is charged to that particular job. The man who starts the work and only does part of it, places a piece of wire on the check to indicate that only part of the job is being done, so that when a check reaches the office with a wire attached to it, it is immediately sent back to the balance of the work.

The cost should be kept in a small indexed book of a convenient size, so that it can be carried in a coat pocket and when estimating on work it should be used as a guide in order to make intelligent quotations. This cost system should be used on every piece of work done or else the men will forget to record the time, but by doing it regularly it will become a habit and really requires no extra time to do it in. It also gives the employer a chance to follow up the work and see if the cost is increasing or decreasing, a matter of some importance in the job plating business with the close competition of to-day.

*Foreman Plater, Enterprise Manufacturing Company, Akron, Ohio.

TITANIUM ALUMINUM BRONZE*

An Interesting Description of Experiments With Titanium in Copper Alloys.

W. M. Corse and Charles Vickers.†

In a number of years of practical experience in the metallurgy of alloys we have never found a more interesting combination of metals than the alloy commonly known as aluminum bronze.

The many obstacles that it presents from the foundryman's standpoint could never have been removed without extended research and able assistance from both our chemical and physical laboratories.

The solution of these difficulties has proven an intenesly interesting and absorbing problem. Comparatively little is known about the action of titanium in alloys. In steel it has established itself on a firm foundation by demonstrating its value through numerous tests both theoretical and practical. The alloy field, however, was scarcely touched until Rossi began the work that became the basis on which future development was started. Rossi patented the alloys of copper, zinc, tin and aluminum with titanium as well as the combinations of various metals containing titanium as a deoxidizer.

The Titanium Alloy Manufacturing Company recognizing the field for research in alloys, detailed Mr. Vickers to study the alloys of copper with particular reference to their possible improvement with titanium or its compounds. After three years of careful research, during which thousands of alloys were made, the indications of a marked improvement in the copper aluminum alloys by the addition of titanium compounds were quite conclusive.

The practical result has been the organizing of a bronze foundry specializing on titanium aluminum bronzes. Niagara Falls has scored again in the research world, and put itself one step nearer the goal which will make it the research center of America.

Alloys of copper and aluminum were discovered over fifty years ago by Dr. Percy and their useful properties described by Mons. Debray. The high price of aluminum at that time retarded their development and until that metal was produced by the electrolytic process not much was accomplished with them. They are well described by the late E. S. Sperry, who said:

"No copper alloy held out more promise at the time it was produced commercially, and none has proved more disappointing than aluminum bronze. After much good and bad experience with it, I will frankly say that it is a bronze without a peer, and the early 'worshippers' of it did not overrate it by any means. The lack of success has been caused by the difficulty in casting it, and not from any absence of merit in the metal itself. . . . Unlike the tin bronzes, there is no tendency for the aluminum to separate in different alloys and liquation has never been found to interfere. It is safe to say that they are the most homogeneous of any known bronzes. Neither do they show the tendency to crystallize like the brasses or other alloys of copper containing zinc. Crystallization has never been found. They are, therefore, 'safe' alloys for construction purposes. To illustrate this point, I may say that thousands and thousands of small pins of cast aluminum bronze (10.5 per cent. aluminum) have been used by the United States Government in the Springfield rifle. These pins, called 'firing pins,' were used for firing the cartridges, and were employed because steel would not stand. . . . The greatest obstacle in the way of casting aluminum bronze is its oxidation when melted. Whenever the surface of the molten metal is exposed to the air a film of oxide of aluminum forms on it. The more it is exposed, the greater the amount. This explains why such a large amount of dross forms when aluminum bronze is being stirred. When allowed to remain at rest in a crucible, very little forms, as the surface of the metal is protected by the film already on it. It also shows why aluminum bronze should always be poured with as little stirring as possible. Any agent, such as wet sand, which tends to stir the metal up, produces dross and the accompanying dirty castings. The more quietly aluminum bronze can be poured, the better the castings. . . . To cast the aluminum bronze without the presence of some dross on the surface is a very difficult matter; and theoretically the right method of doing it would be to cast in a vacuum or neutral atmosphere, so that no air would come in contact with the molten metal. This, of course, is not commercially possible. The only method by which it can be cast in a commercial manner is to prevent its being agitated while the pouring is taking place, either by stirring, too high a drop from the crucible to the mold, or by wet sand. The more quietly it can be poured, the smaller the quantity of dross. Dross which forms in melting may be skimmed off, but that which forms while the pouring is taking place enters the casting. The various skim gates, pouring from the bottom, etc., are all efficacious, as they serve to trap the dross and prevent its entrance into the casting. . . . There is no addition that can be made to overcome the dross formation, nor will any flux obviate it. . . . The secret, if it may be called so, seems to lie in preventing the entrance of the dross into the casting, and not in its formation. While the presence of dross is the greatest obstacle encountered in the casting of aluminum bronze, it may be said that the shrinkage is the next. All strong metals shrink considerably, and in the case of aluminum bronze the shrinkage is equal to that of steel. . . . Shrinkage is easily taken care of if a molder understands his business. By the use of sufficiently large risers and freedom from sharp corners in the casting, with an ample gate, any shrinkage may be readily overcome."

These properties were also reported by Messrs. Carpenter and Edwards, whose exhaustive treatise on copper and aluminum alloys presented as the Eighth Report to the Alloys Research Committee of the Institution of Mechanical Engineers of Great Britain, and later in a paper entitled "The Production of Castings to Withstand High Pressures" before the same body, form a classic on the subject.

They summarize their work on pp. 57-60 of the report as follows:

More than 1,000 tests have been made, exclusive of about 200 specimens that have been microscopically examined and photographed.

(a) The number of alloys that have been found of any industrial and technical promise is small. Such alloys are chiefly those very rich in copper. At this end of the series the limit of serviceable alloys must be placed at 11 per cent. At the other end of the series the limit is even smaller. Among the specifically light alloys rich in aluminum the limit is probably not higher than 4 per cent. of copper. Between 11 and 96 per cent, of aluminum (exclusive) the alloys do not appear to be of any practical promise.

(b) But if the range of serviceable alloys is narrow their quality is certainly high in several instances. This statement holds for certain of the rich copper alloys con-

*Read before the Detroit Foundrymen's Association on April 8, 1915.

†With the Titanium Alloys Manufacturing Company, Niagara Falls, N. Y.

taining between 7 and 10 per cent. of aluminum. It is not going too far to say that in certain respects the best of them equal and even surpass high quality steels of the same general character.

(c) Four features of the results of the tensile-stress tests of outstanding interest merit a special comment.

(1) In view of the doubt which exists at the present time as to whether copper and its alloys possess true yield-points, it is important to record that from 0.1 to 9 per cent. of aluminum the alloys possess clearly-marked yield-points.

(2) It has been recently shown by Messrs. Stanton and Bairstow that the primitive yield-point of a rolled or forged steel is usually an artificial figure, and is due to a stiffening caused by this mechanical treatment. Such is not the case with these alloys. Their primitive yield-point is the true one.

(3) The ductilities (considered as a product of the percentage elongation and reduction of area) of alloys containing from 0.1 to 7.35 per cent. of aluminum are very high and practically constant, even although the tenacity increases markedly with rise of aluminum.

(4) The tenacity and ductility of the widely-known "aluminum bronze" or "gold," containing 10 per cent. of aluminum, have been found to be as good in the form of small chill castings as in the rolled bar, where an 80 per cent. reduction of area of the original ingot has been effected. So far as the authors have been able to learn, this result has no parallel. At their request therefore independent tests were instituted at the Broughton Copper Works, and these have confirmed the above result, which may have important practical consequences.

(d) The research has brought to light several striking instances of the profound influence of a small quantity of aluminum upon copper, notably in the tension tests, but especially in the torsion and electrical conductivity experiments. One tenth of 1 per cent. raises the angle of twist of copper in torsion 90 per cent.; it lowers the electrical conductivity 23 per cent.

(e) The behavior in torsional stress of the alloys containing from 0.1 to 7.35 per cent. of aluminum is one of the outstanding features of the report.

(f) The alloys containing from 5 to 10 per cent. of aluminum have come well out of the dynamic-stress tests. The particular merit of alloys No. 9 (7.35 per cent. aluminum) and No. 13 (9.90 per cent. aluminum) when tested in alternating stress is the close approximation of the maximum stress under which they will bear an unlimited number of reversals to the stress at the elastic limit as determined in a tensile test. In this respect they are markedly superior to the iron and steel specimens hitherto investigated.

Alloys No. 6 (5.07 per cent. aluminum), No. 9 (7.35 per cent. aluminum) and No. 13 (9.90 per cent. aluminum) stood up well when repeatedly stressed beyond the yield-point in Arnold's test. In fact, Professor Arnold has informed the authors that "Alloy No. 9 constitutes a record in its capacity of resisting alterations."

(g) At about 15 per cent. of aluminum the alloys are entitled to rank with quenched steels in hardness. Thus the hardness number of No. 17 (15.38 per cent.) in the cast state (untreated) is 539, which is about that of a 0.45 per cent. carbon steel quenched in water at 20° C. (68° F.), and is only slightly lower than that of a 0.66 per cent. carbon steel similarly treated.

(h) In the corrosion tests, which were purposely made as severe as possible, alloys containing from 1 to 10 per cent. of aluminum have shown themselves to be practically incorrodible by sea water, whether alone or bolted to a plate of mild steel. In these tests they showed themselves superior both to Muntz metal and Naval brass, which corroded appreciably. In tap water of medium temporary hardness the positions were exactly reversed.

(L) Finally, a special comment must be made on the truly extraordinary similarity in physical and mechanical qualities between Alloy No. 13, which consists of 90.06 per cent. of copper + 9.90 per cent. of aluminum and Swedish Bessemer rolled steel of about 0.35 per cent. of carbon and 38 tons per square inch ultimate tensile stress.

With such a wealth of data available on these alloys it is natural that interest in them should be aroused in the foundry. Practical commercial work has conclusively shown, however, that the difficulties of casting are very great. As Sperry says, the lack of success has been caused by the difficulty in casting it, and not from any lack of merit of the metal itself.

When titanium compounds are added to aluminum bronze their action seems to be similar to that in steel, viz.: the removal of oxides and reduction of segregation. As the presence of oxide of aluminum is very detrimental in any alloy and as dissolved oxygen and nitrogen should be removed, this action of titanium is of great advantage.

The practical results of the application of this theory has been to make possible the commercial production small and large titanium aluminum bronze castings with no more than the normal percentage of foundry loss.

This does not mean that any of the precautions noted can be neglected. In fact, no alloy that we have used requires more care and supervision.

The results, however, fully justify the exercise of care, for castings of clean titanium aluminum bronze certainly warrant Prof. Thurston's opinion:

"It works well, casts well, holds a fine surface under the tool, and when exposed to the weather; and it is, in every respect, considered the best bronze yet known."

BRASS SOLUTION.

A certain indication that the solution contains too large a quantity of free cyanide is when the anodes present a bright appearance while the current is passing. The anodes during the working of the solution should have a dark brownish appearance, clearing up when the current is stopped. Another frequent cause of the anodes coating over is an insufficient amount of metal in the solution. All plating solutions offer considerable resistance to the passage of the electric current, and as there is a limit to the amount of cyanide that can be beneficially used, other salts are added to diminish the resistance, these consisting mostly of the carbonates of soda or potash, or their hydrates.

While the composition of brass solution may be perfect in every respect, a proper regulation of the current strength, the amount of anode surface exposed, and their distance from the cathode have considerable influence on the deposition of this alloy. It will be found in working the solution that a variety of shades can be produced from one solution, depending upon its temperature and the strength of the current. The higher the voltage, the greater the excess of zinc deposited; while a current of low intensity tends to deposit copper alone. My own preference is from 2.5 to 3.5 volts, depending on the density of the solution.—H. E. Willmore in American Electro-Plater's Society Bulletin.

REMOVING GREASE BY ELECTRICITY

THE MODERN WAY TO PREPARE METAL ARTICLES FOR PLATING OPERATIONS.

BY THOMAS BROWN.*

CHARACTER OF MATERIAL TO BE REMOVED.

Among the many interesting and difficult problems incident to the electro-deposition of metals, there is one which has its beginning in the polishing room and which must be met and overcome successfully before a single piece of work can be plated. This of course is the removal of the grease which accumulates upon the work to be plated during the various operations of polishing. During the polishing process of "coloring" or "fining" considerable quantities of grease and oil are used for purposes of lubrication, cutting and "coloring." The grease comes from the emery paste which is universally employed in these operations and the oil from direct applications to the wheel as a cooling and lubricating agent. The emery paste, which consists for the most part of tallow or similar greases and fine emery, while contributing in large measure to the subsequent difficulties encountered in the plating room, is by no means the most important element involved in this trying problem. The oil is very apt to cause more trouble and inconvenience, not to say expense, than all the emery paste that could be used on any class of work. The oil most frequently used is lard oil. This when pure presents no very difficult problem, as it is an animal oil and is readily saponified or changed to soap and thus is converted into a soluble compound and easily disposed of. But it is not always to be obtained "pure." Owing to its rather high price, color and odor, it offers a fertile field for adulteration by those who believe in "turning an honest penny."

Cheap mineral oils are the adulterants most generally employed in this gentle sport and it is due to them that most of the troubles traceable to the oil are due. During the polishing process, the articles which are being processed are heated to rather high temperatures from frictional contact with the polishing wheel. This expands the metal, and the pores absorb the oil and grease and when finally finished, they are covered with a heavy coating of these troublesome compounds. They are then ready for the first stage of the plating process, proper removal of all grease and oil. This must be removed entirely and without question. The polished pieces must present a chemically clean surface or the subsequent operations will be in vain. The ancient and honorable plan was to have a boiling hot cauldron of lye or "potash" in which the polished articles were dipped and scrubbed, dipped and scrubbed, again and again until they were free of all oil and grease. They were then covered with a beautiful coating of oxide or tarnish which must needs be removed in some way before they could be scoured. Recourse was had to an acid dip composed of hydrochloric acid and water, prepared for this purpose. They were immersed in this until the tarnish was removed, which although it only required a few seconds, necessitated another operation and in some cases of work with deep recesses or interstices, required brushing, which spells hand work, or, in short, expense. This operation often was the cause of additional trouble owing to the etching of the highly polished surface of the work being treated. Work that had been etched, often had to be repolished in order to bring up the proper lustre necessary to a good finish. After removal from the acid dip, the goods were then ready for scouring or scrubbing, in the case of large pieces. Small work which is handled in baskets or on strings could often be placed directly into the plating bath without further attention. However, work which requires scouring with pumice or Vienna lime is hung in the plating solution after this operation is completed.

THE ELECTRIC CLEANER.

The more modern and economical method of removing grease and oil from work which is to be plated, is to hang or suspend it in an electric-cleaner tank for a few minutes. This method is by far the best way of cleaning all metal work which is to be plated. Various kinds of cleaning agents can be employed. A steel or iron tank of sufficient size which is equipped with suitable means for heating the solution is employed. The tank is arranged in the usual way as for ordinary plating, steel or carbon anodes or even copper anodes being used. No rheostat is required—only an ordinary cut-out switch need be installed. The practice with many, in arranging a cleaner of this class is to so arrange the electrical connections as to make the tank holding the solution the anode.

This arrangement while economical as to anodes is not productive of the best results. In the first place, if the cleaner be large, the work which happens to be hung in the center of the tank midway between the sides of the tank does not receive the full benefit of the current, and the electrical action on these pieces is generally weaker than good practice demands. Another important point tending to lower or hinder the passage of the current is the accumulation of the grease and dirt upon the bottom of the tank, after continued use. The presence of steam coils alongside the sides or bottom of the tank also may be a contributing cause of some slight difficulties in this connection. It may be well while considering this phase of the subject to give a little importance to the position of the heating coils. These should be placed at the sides of the tank, in such a manner as not to touch the tank, and never upon the bottom, as they will be covered with the grease which descends to the bottom of the tank, if they are positioned thus. It should hardly be necessary to point out that in the event of their being placed at the bottom of the tank and their final submergence in heavy emery-laden grease, that an enormous loss in heating efficiency would result therefrom. The work is hung on the cathode rod and the full voltage available is used.

THE ELECTROLYTE AND ITS CARE.

The solution which is composed of soda or potash-lye, soda-ash or sodium carbonate is kept at or near the boiling point. The more current employed in this action and the hotter the solution is kept determines the rapidity of the resulting action. Hydrogen gas is evolved rapidly on the work which has been placed in the cleaner and is the direct cause of the rapid working of the process. The gas forms on the surface of the metal underneath the grease and literally "pushes" it off. The boiling hot solution plays its part in dissolving and melting the grease, which if it be heavy and laden with emery, sinks to the bottom of the tank. This is due to the action of the current in "pushing" it off the work. In this case, it is removed from the work before it is thoroughly saponified or dissolved and finally finds it way to the bottom of the tank, where it can be scooped out at intervals of a couple of weeks or a month. It is not necessary to waste the solution when cleaning the tank. The clear solution can be siphoned off into barrels or empty water tanks while the

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tank is being cleaned. This solution can be used over and over again. A simple and very effective cleaning solution for use in this way is made of sodium carbonate (washing soda). The strength can best be determined by consideration of the class of material to be treated. Probably 2 pounds to a gallon of water would make a solution suitable for most work. This, if strong enough, would readily remove lacquer and air-drying paints and lacquer enamels as well as grease and oil. Where machine oil presents the problem of removal, as in the case of screw-machine products, stampings, turnings, etc., the top of the solution will frequently require to be scooped clean of the accumulated oil, as oils of this character are generally of mineral origin and are impossible of saponification. For removing baked enamels, japan and similar finishes, a solution composed of sodium or potassium hydroxide (caustic soda or caustic potash) should be used. As in all other cleaning solutions the strength of such a solution must be governed by the character of work to be cleaned as well as the material to be removed. The two prime requisites for the successful operation of any cleaners of this type, aside from the nature of the solution, are electric current and current pressure considered together, and temperature of the cleaning solution. There must be an abundance of current which may run from 10 to 20 or more amperes per square foot. Hooks sufficiently large to carry these loads must be used. Thin wire should be avoided as it heats to redness very easily. If wire or hooks large enough are employed, there will be no danger of the operator burning his fingers. Voltage is equally important. From six to twelve volts, depending on the amount of work in the tank, are necessary for rapid cleaning and rapidity of operation prevents tarnishing of the work. For brass or bronze metal and ordinary steel or iron work, where only ordinary polishing dirt is to be removed, a solution of sodium carbonate, which, by the way, is about the cheapest article that can be purchased for the purpose, should be used. Rapidity of operation has another determining influence on the success of any process, in this as in all others—and that is production and cost.

In using an electric cleaner, definite and substantial economies with an increased output will be immediately realized over the older method of boiling in lye and brushing. The acid dip will be dispensed with and the labor and material incident thereto will be saved. One man can clean enough work to keep a large number of platers busy. The process consists in merely hanging in the work for a minute or two or somewhat longer (this depending entirely on the character of the substance to be removed) and removing it from the tank and placing it in cold water until it is plated. In large establishments this factor alone will save a great deal of labor as there is absolutely no handwork to speak of.

APPLICATIONS OF THE PROCESS.

Copper can be deposited satisfactorily on some classes of work while the work is being cleaned. The plate produced in this way serves for a prime plate, but is only satisfactory upon small parts. Copper anodes must be used for a cleaner of this nature. Such a solution should contain some free caustic soda or potash, and copper cyanide can be added in moderate quantity to supply the metal in solution. The anodes will perform the double purpose of supplying current and metal then, as in an ordinary plating tank. This type of cleaner is not infallible and its use is restricted to certain classes of work and is therefore not recommended for general use. It is capable of extensive application if carefully studied and there is doubtless room for large improvement in cleaners of this class. There is a possibility of producing brass and bronze plate in this way as well as copper, by the addition of zinc to the solution and this phase of the subject should present a fertile field for future experimentation by those who are interested and who have the time at their disposal.

Cleaners of the electric type are not restricted to any one class of work, but find a wide application in the speedy and economical removal of all kinds of plating or polishing room dirt. One of the very important uses to which a cleaner can be put is the removal of buffing grease, which is a problem of no inconsiderable size in the average plating or polishing department. One of the chief difficulties encountered in this work is the prevention of tarnish or other discoloration and the maintenance of the highly colored surface. Particular care is necessary when cleaning brass or bronze metal surfaces which have been highly buffed or plates of either of these. Nickel plate, German silver and similar surfaces while presenting difficulties of no mean order are, on the whole, not quite as troublesome in this respect as brass or bronze. The character of the work, of course in this, as in the preplating cleaning, has a large bearing on the successful outcome of any method for the removal of this grease.

Speaking generally, and with only slight modifications necessary, which are entirely governed by circumstances, it is quite safe to say that a cleaner made entirely of sodium carbonate and water, and of moderate strength, will suffice for the thorough removal in an efficient manner of all buffing-grease on most classes of work. But it must be used as hot as possible. Boiling or very near the boiling point, with an abundance of current-pressure will in nearly all cases produce a combination that will handle satisfactorily the most difficult problems to be met in the ordinary course of events.

SOME FINAL CONSIDERATIONS.

In conjunction with the process and methods described in the foregoing, it may be well to sound a note of caution or rather of conservatism. There are in these methods and processes, as in all others, elements of trouble and uncertain results which are apt to crop up to the astonishment and bewilderment of the inexperienced and to seem almost inexplicable. It is quite possible, as previously pointed out, that the class of work or material to be removed therefrom may be a primary or only a contributing cause. Again the solution may be at fault. Too long operation without cleaning of the containing tank may have a harmful effect. On the other hand, any trouble is likely to be due to an unsufficiency of electrical energy, or as is frequently the case, to too low a working temperature. When a cleaner of any of the types described fails in any essential, such failure is invariably traceable to one or more of the causes referred to in the preceding. It is then imperative that these potentials be looked into and the cause of any misbehavior on the part of the cleaner thoroughly investigated and studied. However, it will only be in extreme cases that any serious trouble will be encountered. We hear much nowadays of "efficiency." In many respects this a fine thing for everyone, and the tendency is to standardize and simplify everything that can be simplified or improved. When this tendency is kept within normal bounds, it undoubtedly is productive of much that is good, but some cases have occurred where so-called "efficiency" has defeated its own purpose. Therefore before adopting any reform or new system, it is well to inquire into all factors that have a direct bearing on the results to be obtained. This is true of electric cleaners as of everything else, and if it is found advisable to adopt any one kind for a particular purpose, it cannot be too strongly urged that all elements involved be most carefully considered and weighed.

This, naturally, is but good business policy, and it ought hardly to be necessary to point out such obvious necessities. And it may be said that it is unnecessary to repeat a warning involving as it does, such elemental questions of business policy. There is good reason for such warning, however. Some platers are ready to adopt without sufficient investigation almost any scheme or process that promises to make their work easier or more profitable. It is for the benefit of these few that such care has been taken to advise caution. This advice is of a general nature and of no particular application to the subject treated in this article. It is repeated again that electric cleaning is the most efficient way of cleaning most all kinds of metal work and in most cases is without a peer—but the caution is again sounded—study your particular problem from all angles and "be sure you are right, then go ahead."

It may be well before concluding to go back a little to the subject of the physical arrangements of electric cleaners. Particular reference is made to the tank. There may be some objections advanced about the facilities for thoroughly cleaning out a large tank, where no provision is made for getting rid of the water used for flushing out such a tank after the grease has been scooped out.

A very simple arrangement is to have a valve of some sort placed in the bottom of the tank, preferably in the center of the bottom plate or at one end at the bottom of the end plate, and as low down as possible. Another excellent idea is to have a square hole cut in a similar position in the end plate, and of a size large enough to permit of shoveling out the accumulated grease and dirt. This can be covered with a plate of sufficient size which can be bolted in place. Such an arrangement would be simple and highly efficient. If found convenient, either of these arrangements would permit of the rapid emptying or cleaning of the tank if occasion demanded that the entire solution be disposed of.

It is very likely that some one or other of the cleaners described, or a combination of a few of the suggestions outlined in this article will be of use to many who meet these problems in the course of their daily work. It is hoped that if any of the ideas herein suggested are capable of adoption, that success will crown the efforts of those who utilize them, for cannot it be truly said of those who adopt that which is new and of proven worth, that they have the ambition and initiative to excel?

THE FOUNDRY USE OF NON-FERROUS SCRAP METALS*

AN INTERESTING RECITAL OF HOW UNCLE SAM SAVES MONEY IN HIS OWN SHOP.

BY LIEUTENANT F. M. PERKINS, U. S. N.

(Concluded from April.)

These results are entered on the "Scrap-Metal Record" card forwarded to the master molder, who files the cards for reference when using the scrap.

Fig. 3 shows this card with entries for a heat of scrap valves and pressure castings. It will be noticed that the card also shows the analysis, tensile strength, elongation and melting loss. The scrap is used in the foundry in accordance with the instructions on the card, and in one or more heats for each lot of scrap used test bars are taken, and the tensile strength, elongation and chemical analysis of the metal after recasting are entered on the back of the card. The comparison of the properties of the metal before and after being "sweetened up" with virgin metal affords interesting and valuable information. A little experience will enable one to accurately control the composition of the brass-foundry products and to predict very closely what the properties of a given lot of scrap will be when corrected and made into castings. The card gives a fairly complete record for practical foundry purposes and enables the foundryman to do his melting scientifically, accurately and without guesswork.

SCRAP METAL RECORD

HEAT NO	DATE	KIND OF SCRAP MELTED
20	11/19/14	Comp. G - Navy valves and pressure castings.

CHARGED	RECOVERED	LBS LOSS	PER CENT LOSS
4800	4695	105	2.2

ANALYSIS

Copper	86.64	Antimony		TENSILE STRNGTH	41750
Tin	8.87	Manganese			
Lead	0.64	Phosphorus		ELONGATION	6.75
Zinc	4.05	Iron	Trace		

This Scrap is best suited for Comp. G - Gun Bronze

To obtain same, add the following to each 100 lbs. of ingot:

COPPER	TIN	PHOS. TIN	LEAD	ZINC	ANTIMONY		
78	8½	1½	—	—	—		

A RECORD CARD FOR SCRAP METAL.

A careful study and conscientious use of such records and a little study of the principles of furnace and crucible operation will soon permit one to use a considerable percentage of scrap and to improve the quality of the metal at the same time. All that is required of the melter are average intelligence and absolute obedience in following instructions. Many melters, like to surround their operations with mystery, and some of them have their own brand of jealously-guarded "dope" which they introduce into the ladle and whose principal effect is to create a large cloud of smoke and many admiring glances from the helpers and apprentice boys. While experience in a melter is desirable it is not essential. Under proper supervision any intelligent, willing man interested in learning can be made into a first-class brass melter in three months.

PRECAUTION OBSERVED IN MELTING.

The principal points to be cared for in good practice are care in the preparation of the scrap, adherence to the specifications governing the composition of the metal, and the observance of a few well-known principles of melting. The most essential of these principles are:

1. Protection of the metal from oxidation during melting. This is ordinarily accomplished mechanically by covering the bath with charcoal or by otherwise preventing the flame and air from coming in direct contact with the metal, as by the use of covered crucibles.

2. Deoxidation of the metal after melting. Oxidation cannot be entirely prevented during melting. After melting it can be deoxidized chemically to a certain extent by the addition of some substance having

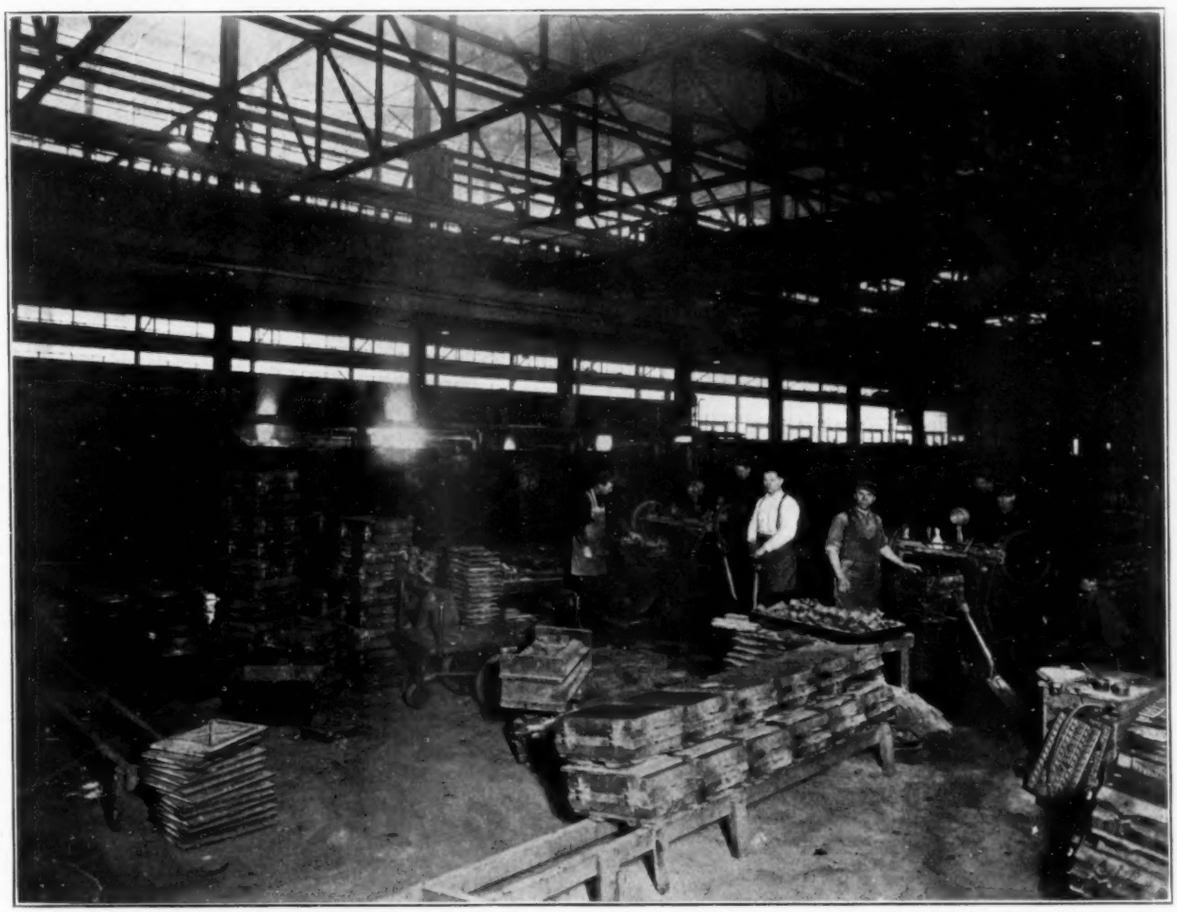
*Paper in the Journal of the American Society of Naval Engineers, February, 1915.

a greater affinity for oxygen than the alloy. One of the best agents for this purpose is from .75 per cent. to 1 per cent. of phosphor tin (a mixture containing 95 per cent. tin, 5 per cent. phosphorus). Phosphor copper is used when the metal to be deoxidized does not contain tin. As phosphor copper contains 10 per cent. phosphorus only half as much need be used. It is a mistake to assume that the more phosphorus is introduced the cleaner the metal will be. If the proper amount is used it will take up the oxygen and pass off as gas, and the metal will show barely a trace of phosphorus or none at all. If too much is used only that which combines with the oxygen will pass off and the remainder will remain in the metal and cause blow-holes.

3. Melting the metals in the inverse order of their fusibility and volatility, i. e., melting that metal first which is the least volatile and has the highest melting point. There are a few metals which are more volatile than others having a lower melting point and, in order to reduce the melting loss, the volatility should, in such cases, be the first and fusibility the second consideration. Zinc is the most common example of this met with in foundry practice; it has a higher melting point than tin or lead, but is much more volatile than either and is added last.

4. Thorough mixture of the metal composing the alloy. This is accomplished mechanically by means of a stirring rod used in the furnace and also in the ladle. As each new metal is added it should be thoroughly stirred as soon as it has run down. The last operation before pouring the mold should be to stir the metal and, in case of the white-metal alloys, it will be found beneficial to continue gently stirring the metal in the ladle during pouring. A metal which has been found to contain pin-holes, blow-holes or flaws can often be made perfectly good simply by remelting.

5. Pouring the metal at the proper temperature. This is important, but one of the most difficult points to control. The proper temperatures of pouring must first be known and some quick and reliable method of measuring them must be provided. Correct casting temperatures have been determined for a few metals, but not for the majority of them. A scientific investigation of the melting temperature and casting temperature upon the principal alloys would be of the greatest value. The main points to be covered would be the effects upon strength, elasticity, hardness and soundness. The alloys investigated should not be chemically pure, but should contain the impurities to the extent ordinarily found in actual practice. The metal should not be overheated and allowed to cool; this practice increases the furnace loss and produces inferior castings. The metal should be removed from the furnace when the proper temperature is reached and poured into the molds as soon as possible. In general, the brasses and bronzes should be poured hot and cooled quickly; rapid cooling or quenching has the opposite effect upon brasses to that produced by



A PORTION OF THE BRASS FOUNDRY IN DODGE BROTHERS PLANT, DETROIT, MICH., SHOWING MOULDERS AT WORK. IN THIS FOUNDRY 30,000 POUNDS OF BRASS ARE HANDLED EACH DAY. OVERHEAD TRAVELING CRANES FACILITATE THE WORK.

the same means upon iron. Rapid cooling or chilling a brass or bronze casting increases its strength and decreases its hardness. Various makes of electrical and optical pyrometers are on the market for determining the temperatures of molten brass. A great many of them are inaccurate or unpractical. Investigation to determine the best pyrometer for brass-foundry use would be of value after proper casting temperatures had been determined.

6. Removal of dirt, dross and foreign matter by the use of suitable fluxes. The fluxing material—borax, salt or salammoniac—is thrown upon the surface of the metal in the ladle and well stirred in. The resulting dross or slag which forms on the surface is then skimmed off.

It has been found from experience that a very high percentage of scrap can be used if it is clean and well suited to the alloy in which it is used. In fact, high-grade scrap alone with the addition of sufficient zinc to replace the loss due to volatilization will often make excellent castings entirely complying with the chemical and physical requirements of the specifications. To take proper advantage of such high-grade scrap it is necessary that the method of pigging and melting by analysis be followed. In the case of the high copper-bearing alloys (gun bronze, phosphor bronze, valve bronze, etc.), the greatest difficulty encountered in the use of scrap is to keep the iron at the very low point required by the specifications, hence the necessity, previously mentioned, of taking every precaution to remove iron from scrap castings and to prevent it being mixed with borings and turnings. Lead also gives trouble and will be referred to later.

In order to reduce the relative amount of iron it is often necessary to add considerably more new metal to a given amount of scrap than would be required if the scrap contained less iron. Experience would seem to indicate that the allowable percentage of iron could be increased without detriment to the metal. The presence of a small amount of iron in gun, valve and phosphor bronze within certain limits seems to cause a slight increase in tensile strength and a slight decrease in elongation. As the amount of iron is increased the tensile strength and elongation decrease. This statement is not based upon accurate, scientific experiment, but upon data collected in the ordinary course of foundry operation. It would be interesting, instructive and of actual value to determine by exact laboratory methods the actual effect of varying percentages of iron upon several of the bronzes with the object of increasing the allowable maximum if found advisable.

The following table shows the composition, tensile strength and elongation of five heats of scrap containing iron:

Heat No.	Cu.	Sn.	Zn.	Pb.	Fe.	T. S.	Per cent. elong.
1	87.02	8.65	3.94	0.15	0.24	39,000	8.6
2	86.64	7.90	4.56	0.69	0.21	42,550	10.5
3	85.92	7.90	5.30	0.75	0.13	39,475	7.8
4	85.60	6.78	5.97	1.65	Trace	27,730	14.0
5	71.88	1.57	25.93	0.28	0.34	31,100	18.8

Numbers 1, 2 and 3 are suitable for conversion to gun, valve or phosphor bronze, but, on account of the comparatively large amounts of iron in the scrap, it will be necessary to add an excessive amount of new metal to reduce the percentage of iron to the point required by the specifications. Therefore, the scrap will form but a small percentage of the total melt, and the saving due to its use will be comparatively small. Number 4 contains only a trace of iron, but is rather high in lead and zinc. The addition of 59 pounds of copper, 7 pounds of tin and 1 of phosphor tin as a deoxidizer to the number 4 scrap will convert it into good valve bronze, the above amounts being added to 100 pounds of the scrap. In this case the resulting metal will contain 60 per cent. of scrap, and the saving due to its use will be considerable. This illustrates the necessity of keeping iron out of brass scrap and shows the saving that can be effected thereby. Number 5 is too high in zinc to be suitable for anything but yellow brass and should be converted to such by the addition of proper amounts of lead and zinc.

The following table shows the composition, tensile strength and elongation of thirteen heats of gun and valve bronze which contain, on the average, about 50 per cent. of new metal and 50 per cent. of scrap.

Heat No.	Cu.	Sn.	Zn.	Pb.	T. S.	Per cent. elong.
1	86.64	9.38	3.03	0.95	35,240	24.2
2	87.51	8.75	3.64	0.10	38,610	25.0
3	87.26	8.33	4.01	0.40	34,240	19.5
4	86.72	8.80	3.59	0.89	39,400	18.75
5	88.42	8.76	2.32	0.50	38,700	21.9
6	88.36	7.67	3.24	0.48	36,260	25.0
7	87.28	7.28	4.01	1.43	34,370	18.75
8	89.03	7.67	2.49	0.81	36,480	25.0
9	87.85	7.56	4.09	0.50	32,630	15.6
10	88.59	7.61	3.21	0.59	35,400	20.3
11	88.39	7.45	3.55	0.61	34,370	18.75
12	88.26	7.37	3.75	0.62	34,870	18.75
13	88.11	8.02	2.98	0.89	35,240	20.3

In only one heat are the specifications compiled with (No. 2) for gun bronze in so far as the lead content is concerned (not over 0.20 per cent.). The others meet the specifications for valve bronze. The tensile strength and elongation are, however, uniformly excellent and in every case exceed the requirements of gun bronze.

The following table shows the results obtained from eight heats of gun bronze made entirely from first-grade ingot (new) metal:

Heat No.	Cu.	Sn.	Zn.	Pb.	T. S.	Per cent. elong.
1	87.36	10.01	2.54	0.09	30,940	10.1
2	87.44	10.24	2.22	0.10	33,100	11.7
3	87.45	10.17	2.22	0.16	32,770	12.5
4	87.20	10.37	2.32	0.07	30,920	10.9
5	87.20	11.00	1.64	0.16	31,460	8.6
6	86.59	10.87	2.47	0.07	31,380	9.4
7	87.70	10.21	2.06	0.03	34,370	14.1
8	87.20	9.73	3.03	0.04	31,520	12.5

Note that the requirements of the specifications are not met as regards elongation. This is not offered as proof that 15 per cent. or more of elongation cannot be obtained in gun bronze, for by careful melting this percentage can be obtained. Comparison of the two preceding tables does show, however, that for the same melting practice better metal can be made by the proper use of good scrap comparatively free from impurities. The scrap should be of the approximate composition of the alloy being made and may be used to advantage in amounts varying from 10 per cent. to 60 per cent. It has been found that, when properly used, scrap not only improves the strength and elasticity, but the soundness of the castings as well, and soundness is often the primary consideration. The writer has talked over this matter with a number of foundry foremen, and in each case his own experience has been confirmed, i. e., that it is possible to produce better castings when a certain amount of good scrap is used.

The explanation of this probably lies in the fact that pure copper absorbs oxygen and certain gaseous products to a much greater extent than an alloy which results in an increased porosity. This a well-known fact to which the great difficulty of obtaining sound copper castings bears evidence.

It is a difficult matter to obtain scrap in very large quantities sufficiently free from lead for use in alloys where the maximum amount allowed is 0.20 per cent. The elimination of iron is largely a matter of care in handling the scrap, but lead is not so easily removed. In the above table it will be noticed that the lead runs as high as 0.16 per cent. when no scrap is used. This is due to its being contained as an impurity in the other metals.

Foundry results appear to indicate that the amount of lead could be increased with benefit to gun bronze and number one phosphor bronze, in that it would permit a wider use of scrap with the beneficial results before noted, at the same time reducing very materially the cost of the metal.

The general effect of small quantities of lead upon the brasses and bronze is to decrease the hardness and increase the density. In other words, machining qualities are improved and porosity is decreased. Lead is used in valves and pressure castings to make them "close," i. e., to decrease the porosity. Too much lead reduces the strength, but the amount of lead that can be added without a material reduction in strength is fairly high. There are commercial valves, for example, made of valve metal containing 3 per cent. lead and having a tensile strength of 30,000 pounds and an elongation of 20 per cent.

As previously mentioned when considering the effect of iron, the foregoing tables and discussion concerning lead are not based upon scientific experiment, but upon observations made and data collected in the ordinary course of foundry operation.

John Dewrance, in a paper entitled "Bronze," read before the Institute of Metals and later published in "Engineering" and republished in the Journal of the A. S. N. E. for May, 1914, furnishes some very interesting information concerning the effects of lead upon gun bronze tested at different temperatures. He found that straight gun bronze (88-10-2) dropped from a tensile strength of about 32,500 at 350 degrees F. to 19,000 pounds at 400 degrees F. Upon substituting ½ per cent. of lead for an equal amount of copper (giving 87½, 10, 2, ½) he found that the strength of the bronze remained at about 32,000 pounds up to a temperature 550 degrees F., above which it rapidly decreased to 22,500 pounds at 600 degrees F. The variation in elongation he found to be even more pronounced; at 550 degrees F. the alloy containing ½ per cent. lead gave an elongation of 18 per cent., and the straight gun bronze at the same temperature gave an elongation of a trifle less than 2 per cent.

In gun bronze to which had been added 10 per cent. of lead at the expense of the copper was found a strength of 28,500 pounds and an elongation of 10 per cent., and when the amount of lead was increased to 16 per cent. the alloy still had a strength of 25,000 pounds and elongation of 5 per cent. This test was made with the metal heated at 500 degrees F.

In considering these results it should be borne in mind that lead softens the brasses, and therefore a casting which is to be subject to great erosive action should contain but very little lead.

The most authoritative writers on the subject of alloys have usually investigated pure alloys and have taken particular care to see that impurities were eliminated. For this reason reliable information of an exact nature as to the effects of impurities upon brasses and bronzes is very scarce. It is believed that careful investigation of the effects of the use of scrap and of varying amounts of lead and iron in certain alloys used in the navy would corroborate results obtained in the foundry and disclose information which would warrant a wider use of scrap in the higher-grade alloys.

(The End.)

POWER ECONOMY

How a Brass Manufacturing Concern Systematize and Keep a Record of Their Belting.

By P. W. Blair.*

Owing to the large amount of belting used in a brass manufacturing plant on high speed machines and the high expense of cost and upkeep of same, they have adopted a systematized record of each belt in the plant and have found same a valuable element of economical management. Previously to the installation of same a break in a belt was repaired or an exaggerated case of slack remedied. There was no record kept when a new belt was furnished a machine or repairs made on same. Experience has proven that this neglect was expensive. All belts are now subjected to a weekly inspection and one man is given charge of this work and has become an expert. Every six months each belt is put in perfect repair although there are some belts where this heavy wear on same are repaired once a month. The correct length is kept of each belt and speed and tension and the necessary adjustments are made to procure a tension. Every belt in the plant has its symbol and record of installation and repairs that has been furnished on same. Slips are furnished the inspector who fills one out for each task performed that the complete cost and facts entailed can be charged to the belt record and cost sheet. The slip contains blanks for the symbol number the length of belt and the maximum tension; when grease was cleaned from same, when dressed and the dressing used if belt is spliced or laced the amount taken out or put in, cement used and how same is laced.

The tension in pounds indicated by each spring balance before and after tightening. These facts entered periodically in the record of belt gives its exact history which becomes a valuable guide for future buying. At the same time the constant attention insures that each belt is doing its work with an extreme of efficiency and a minimum of depreciation. Previous to the installation of this system belts were repaired in a haphazard manner by a designated employee in each department or by the employees themselves individually.

*Foreman Brass Finishing Department, H. Mueller Manufacturing Company, Sarnia, Ontario, Canada.

ENGLISH PRODUCTION OF CYANIDES.

(United States Consul General Robert P. Skinner, London.)

Cyanides of potash and sodium are produced in large quantities in the United Kingdom, but the production of cyanide of sodium is largely outstripping that of cyanide of potassium, owing, it is stated, to the fact that the former can be more economically produced than the latter.

SAFETY IN FOUNDRY OPERATIONS*

An Interesting Account of the Methods Pursued by a Large Manufacturing Company for the Conservation of Life and Limb.

By Magnus W. Alexander.†

[Note.—While this address was made in Chicago, September, 1914, it has only just now been released for publication, as Dr. Alexander spoke from notes and no printed paper was available.—Ed.]

Fortunately the time has gone by when it was necessary to preach accident prevention as a humane duty and an economic necessity of the employer in order to arouse his interest in the issue. The persistent pleading of some, by word of mouth and by force of example, and more recently the enactment of workmen's compensation laws in 24 States and its strong effect upon accident prevention has created a universal interest in the elimination, or at least in the reduction of accidents and consequent damage to persons and property. Only a few years ago it was timely to call the employer's attention to his duty toward his workmen in matters of safety by quoting even so ancient a book as the Bible, which abounds in exhortation for the exercise of caution and order and safety.

What the employer needs today is not to be told why to promote safety in employment, but how to do it effectively, quickly, economically; direction as a guidance and not direction as an injunction is the call of the hour. There is a large body of evidence on hand to tell of accidents of various kinds and degrees and of their consequences, but this evidence must be studied and analyzed to find the cause of accidents, and having found them, to promulgate the best ways for their elimination or for effective guarding against their consequences. Research in safety and sanitation in employment, in the manner in which research in the technical phases of foundry work is carried on, must take the place of oratorical hysterics about the number of injured and killed, demanded as the yearly toll of our industries, and of superficial advice in regard to the safeguarding of machinery and premises, preached by some so-called safety engineers and inspectors whose opportunist activity is largely based on a surface knowledge of the industries and their requirements and not upon a clear, intelligent, sound understanding of the work itself.

MOST FREQUENT AND DANGEROUS HAZARDS.

What are the most frequent and the most dangerous hazards in foundry work and allied employments the elimination of, or the guarding against which would prevent most and the severest injuries? This fundamental question must engage our first thought. A careful study has revealed in the foundry industry as in other industries, that the cause of the majority of all accidents can be written with one word and with one word only—*Carelessness*. Somebody, the laborer, the mechanic, the molder, the foreman or the manager did not care enough, and that caused the accident. To turn this carelessness into care is the only remedy of the situation, and persistent education of the employer and the employe as to the value of and the necessity for personal care will accomplish the desired result. When once it will have been brought home to everyone so that it becomes part of his unconscious daily thinking, that *personal caution is the greatest safeguard*, then we shall see a reduction in the number of accidents in an astonishing degree. This problem permeates beyond the mechanical industries and beyond industrial employment into all employment, in fact, into all activities of our daily life. Because it is of such general character I shall, on this occasion, take time only to endeavor to fasten upon your mind and consciousness the plain truth that *personal caution is the greatest safeguard after all*, and to direct your attention to the many educational efforts for the promotion of safety which have been tried out at various places, even though not always with full success. In this way I hope to stimulate you to find new means of teaching every workman himself the significance and the value of personal caution.

ORDER MAKES FOR SAFETY.

The twin sister of caution is order; order makes for safety. How important this is in foundry work is hardly necessary to mention to foundry experts. The foundry floor is the field of activity of the foundryman, and here particularly new situations are arising constantly, calling for quick and proper action. Many accidents in the foundry occur because the quick-moving man who carries the ladle with the molten metal stumbles over some castings or other obstruction in the aisles, sometimes over only a small tool. To keep the aisles free of obstruction and keep them wide enough that men can pass in opposite directions without jolting each other, must be an important duty of the foundry manager. The foundry yard on the other hand is the gateway for all materials to and from the foundry; order in piling up castings, in the segregation of the various sands and the coal in properly construtced bins, is not only a matter of much importance from the standpoint of safety, but also from that of quick and economical production.

PERSONAL CAUTION.

Many accidents due to lack of personal caution can be avoided by calling the need for personal caution to the attention of the men. Proper warning signs of one kind and another will be of material help in this connection, for they will show where there are dangerous places and will serve as constant and untiring guards and mentors. These signs should not detract by their peculiar pictorial designs from the lesson which they are intended to preach, but should by their simplicity and directness attract attention to the very word *Danger* or *Caution*. The belief, therefore, is taking hold everywhere that plain signs in the accepted colors of danger, white and red, or of caution, white and green, should be used, and that simple words should be inscribed on them so that these words will eventually become symbols, as today, for instance, skull and crossbones or Thor's fist from which lightning zig-zags emanate, are symbols of danger.

In foundries representatives of many nations are employed, many of them do not speak the English language nor are able to read it. On first thought it might be considered wise to print for their benefit signs in their languages, and yet upon second thought the difficulty and even the impracticability of such a procedure will readily be seen. A sign in several languages will either become so large as to be unwieldy, or else the wording on the sign will be so small as not to be legible from a distance. When the foreigner once learns, by frequently looking at the word *Danger*, that that word stands for the corresponding word in his native tongue, he will have no difficulty in understanding the sign. It, therefore, is believed to be the best plan to print signs in English only, in plain manner and in accepted colors. In some cases other wording will be necessary than the simple

*Address delivered at joint session of the American Foundrymen's Association and the American Institute of Metals, Chicago, September 8, 1914.

†General Electric Company, Schenectady, N. Y.

word *Danger*. The electrical industry needs signs that point out high voltage; the machine shops require signs which tell that a machine is out of order; attention must be called to apparatus that must not be touched; people must be warned to look out for an approaching train. Wherever possible, the word *Danger* should be worked into the sign, which should not have more than two lines.

On the other hand, there may be a danger above the working man: a crane may be under repair or the roof structure may be dangerous, and the employe must be warned as he approaches the spot and long before he gets to the spot, that he should be aware of the danger. Such signs will usually have to stand on the floor; often they will have to be put out in the yard. A metal danger sign should then be used because it will best withstand the conditions of the weather and the ordinary wear and tear. Again, the symbol *Danger* should appear on it; moreover, there should also be painted on it an arrow to point to the source of danger. Often, however, the danger may not be from above; it may be a hole in the ground that should be pointed out. In order to use this sign more universally, it is best to paint the arrow on one side of the sign plate and also on one side of a separate plate, so that the arrow will show on both sides, or on neither according to whether the separate plate is turned one way or the other.

There are many hazards in foundries which cannot be guarded against merely by the exercise of personal caution. Splashing of metal will occur in spite of carefulness and workmen must, therefore, use devices to protect themselves against the resulting consequences. Similarly, employes engaged in chipping castings are liable to have their eyes injured, even though they may be ever so careful in their work, unless suitable eye protectors guard the eyes against injury from flying metal chips. The study of thousands of accidents in foundries and related departments has shown clearly that eye injuries and foot and leg burns were the most frequent consequences of accidents. Efforts of foundry managers must, therefore, be directed first of all toward the introduction of suitable devices to protect eyes against flying chips and dust, splashing molten metal and the excessive glare of light, and to protect feet and legs against burns from molten metal.

EYE PROTECTORS.

The best eye protectors which I have found by investigation and experience are goggles with large, round lenses, of various colors and thicknesses to suit various conditions of service, with flexible bridges and with suitable side protectors. The lenses should be large in size and round in shape in order to give a large field of vision and to make it possible to wear the goggles over ordinary eye-glasses where these are necessary for corrective purposes of the eyes. It would obviously be too expensive to put corrective lenses into goggles where they may easily be marred. The bridge of the goggles should be made of flexible material so that each pair of goggles can readily be adjusted to the shape of the wearer's face. Foremen should demonstrate this feature to the employes who otherwise might complain that the goggles do not fit comfortably and, therefore, might be unwilling to wear them. Some effort on the part of foremen in explaining protective devices to the workmen and in adjusting the same for them will go a long way toward overcoming a natural disinclination to wear such devices.

All goggles should be provided with side protectors; these may be made of perforated leather or of metal screen. While the use of leather side protectors makes the goggles lighter in weight and allows easier and more comfortable adjustment of the same to the face than can be secured by the use of metal side shields, either type offers satisfactory protection and the selection of the type becomes usually a matter of personal preference. One man claims to feel harnessed when wearing goggles with metal side shields, and another objects to leather side protectors because of their less sanitary character. The latter objection is of theoretical rather than practical nature, for the same goggles are usually worn by the same man, and the question of unsanitary character of the goggles, therefore, does not need to enter into consideration; moreover, leather side protectors can be cleansed, if it should become necessary when a pair of such goggles is given to one man after they had already been worn by another. In any event, the side protectors should be permanently fastened to the goggle frame so that they cannot be removed by the workman, for they will not usually replace them.

In order to suit various conditions of service, some goggles must be provided with thin and others with heavy lenses. In most instances thin lenses will serve the purpose of protecting the eyes, and heavy lenses will be required only by employes whose eyes are apt to be injured from flying, heavy metal chips. While it is, of course, desirable to have the lenses withstand the impact of flying particles without breaking generally the interposition of the lens between the eye itself and the flying particle, so as to impede the onrush of the latter long enough to give the eye time to close, will prove a sufficient protection. Nature has provided the eyelid as a guard for the eye against injury from outside sources; "quick as a wink" the eyelid falls over the eye as a foreign substance approaches it. The advantage of thick lenses which will not break under the impact of flying chips must be considered as against the disadvantages of the heavy weight of such goggles and the resulting discomfort of wearing the same.

Some goggles should have clear lenses merely for the protection of the eyes against dust and flying particles; others, in order to eliminate the harmful influence of intensified light on the eye, need lenses of amber or smoke color, while for the use of steel melters dark blue lenses, and for oxy-acetylene welders lenses of a greenish tint are required. The eyes of the arc welder, on the other hand, should not only be protected by lenses of a dense violet color, usually secured by a combination of red and blue glasses, but in this case the protective lenses must be fastened in a hood which will at the same time shield the head of the arc welder from the excessive heat radiated from the arc. A number of devices have been brought out of late to serve as arc welders' hoods or helmets. Some have been made of aluminum, but metal hoods have been found to heat up readily and to be unsatisfactory for that reason; others have been made of wood in the shape of square boxes with open ends, in the front of which the protective lenses are inserted. Such a wooden hood is placed by the arc welder over his head so that it rests on his shoulders while the welding process is going on, and he removes it when the electric current is cut off and his eyes, therefore, are no longer subjected to dangerous glare.

(To be continued.)

EDITORIAL

OLD SERIES
Vol. 21. No. 5.

NEW YORK, MAY, 1915.

NEW SERIES
Vol. 13. No. 5.

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS.

Published Monthly

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THE METAL INDUSTRY PUBLISHING COMPANY (Incorporated)

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

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THE ELECTRO-PLATERS' CONVENTION

In the opening pages of this issue of THE METAL INDUSTRY there is a great deal of information relating to the third annual convention of the American Electro-Platers Society. This convention will be held at the plant of the National Cash Register Company in Dayton, Ohio, on June 3 to 5. No better time or place could have been chosen by the society for its convention than June and Dayton. The two seem to go together, the best month in the year for the promise of things to come and the city which stands for all that is beautiful in things urban and for a wonderful future in business, so the society is to be congratulated upon its wise choice.

We suggested last month that employers of platers should regard convention week in the light of a vacation period, we repeat it here and hope that a large number of platers will be at Dayton and, aside from the business of the convention, take advantage of the wonderful opportunity to see modern plating plants complete in every necessity for successful economic production. We are sure that such an opportunity does not often come and when it does an unusual effort should be made to be one of the fortunate.

A feature of this convention which is to be commended is the decision of the committee to charge a small fee to the delegates and attendants to cover the expense of the convention. This is as it should be and no one will object as it eliminates the possibility of being under obligations to some local organization whose resources might be strained. The practice of raising a fund by the local association of the convention city is getting to be onerous and a convention should in this sense be self-supporting. The small fee charged will not add appreciably to the convention expenses of anyone attending and at the same time will obviate the taxing of not only the local organization, but also will relieve the interested business houses of what seems to be a polite form of "hold up," but which is usually charged to advertising. This latter form of contribution should go into the discard with the menu card and program advertising.

In regards to the exhibiting at the convention of examples of the platers' art and displays of platers' supplies, this is legitimate business and should be encouraged. An excellent opportunity is offered by the gathering of platers for business houses to show their line and announce new processes and apparatus and we hope a number will take advantage of the opening. Chairman Lamoureux states that space is free and facilities will be given for the use of power, etc., for working exhibits. All that is necessary is to get in touch with Mr. Lamoureux and to consign goods to the National Cash

Register Company for the Electro-Platers' Convention at Dayton, Ohio.

BUSINESS CONDITIONS

The reports as to business conditions in various cities of the United States, sent in by correspondents of THE METAL INDUSTRY, are very encouraging. Without an exception, no matter what section of the country is considered, a real improvement in business and industrial circles is apparent. Undoubtedly the war abroad has a great deal to do with present prosperity. A great mass of material is reported on good authority to have been shipped out of the country already and a still larger amount is being prepared. Everywhere we find activity in the preparation of war material, but this is not all. The shipments of foodstuffs, clothing and war munitions have, of course, brought great profits. These profits are now making themselves felt in new investments and banking and business interests are showing more confidence and in a very short time the entire machinery of commerce will be moving forward with that steady roar indicative of good times.

The prices of metals it will be noted by a perusal of our METAL MARKET REPORT, particularly of those metals needed in war material, are abnormally high, but this was to be expected and in the cases of the metals mined here will materially benefit the mining industry. While we have known of 25-cent copper, we cannot remember zinc such as is known as "brass mill spelter" selling as high as 20 cents per pound, with none to be had! This certainly will stimulate the mining of the metal and will permit of actual working of deposits, which heretofore have been only "prospects."

Reports were current in New York last week to the effect that home consumers wants were being neglected, particularly in brass, by the mills in order to take care of export trade. Our Waterbury, Conn., correspondent made a special effort to verify the report. His letter, published in this issue of THE METAL INDUSTRY, disposes of the matter in a few words with the statement that it is not so. No one has been slighted and will not be as capacity is great enough to take care of trade both at home and abroad, although seven days of the week have to be utilized to do it.

CORRESPONDENCE

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

STRENGTH OF METALS VS. COMPOSITION

TO THE EDITOR OF THE METAL INDUSTRY:

Engineers have been startled lately by the failure of various alloys used in the New York City water supply, and manganese bronze for one thing has been given a bad character which it does not deserve. I am afraid engineers do not realize that there is a limit to the strength of metals beyond which it is impossible to go. The more you work a metal the greater becomes its tensile strength and the lower its elongation, but it does not necessarily follow that the more you anneal a metal the lower becomes its tensile strength and the greater the elongation. A cast metal has usually the lowest tensile strength, but its elongation seldom is at its maximum under these conditions. Metals may be considered in general as masses of crystalline form, which are at the maximum size when cast and slowly cooled, and at the minimum when worked to the utmost degree and annealed at the lowest possible temperature to relieve the internal strain.

The actual results obtained depend upon many factors. The art of the metallurgist is to obtain these results in the best possible degree, that of the engineer to make use of these results in his calculations and bear in mind there is a limit of endurance of all metals; when that limit is passed, trouble ensues.

One very necessary set of figures is wanted in metallurgical and engineering practice, namely what is the bona-fide strength of all alloys, both in the cast and worked states, under normal conditions? Every metallurgist knows it is possible to fake alloys by careful selection of material, and by careful casting and rolling to get remarkable results. Another man comes along, gets a ton better tensile after much experimenting, and perhaps a better elongation; he pushes his metal all he can, as is only natural and right he should do, engineers specify this new strength in their specifications; other manufacturers have to endeavor to get this strength; the metal is drawn past the limit of safety and annealed below the limit necessary to relieve the internal strain; the metals fail in practice because the strength required is beyond what may be called the natural strength. The metals used in metallurgy are getting purer and purer with the advance of science. Sometimes this excessive purity is not a good thing for all classes of work; for example, tough cake copper is superior to its American equivalent, which is far purer.

Without taking into consideration the gun metal group and what may be called fancy alloys, such as silicon bronze and aluminium bronze, the copper alloys used by engineers belong to the brass family containing from 54 per cent. to 90 per cent. copper and the balance zinc. Other metals are added for definite purposes. This great group of alloys may be divided roughly into those that are workable in the cold only and those which can be worked hot. From 54 per cent. to 63 per cent. copper, these alloys can be worked hot, while those containing from 63 per cent. to 90 per cent. copper can only be worked in the cold, except under very special conditions. These two groups are sharply divided microscopically, the group containing from 63 per cent. to 90 per cent. copper contains only one visible microscopic constituent, although opinions vary as to whether it is a solid solution of a chemical compound or not; this is referred to as the alpha constituent. Below 63 per cent. copper the beta constituent begins to show itself, and under normal conditions brass will not roll hot unless this beta constituent is present. If much lead is present in 63/37 metal it will not roll hot, but if made from very pure spelter it will.

If we compare the tensile strength and elongation of the brasses starting from 90 per cent. downwards, there is a gradual increase in the strength to about 80 per cent. copper, when it remains fairly steady until about 65 per cent. copper. There is a considerable increase from 65 per cent. to 54 per cent., when the tensile strength rapidly falls away, until at about 40 per cent. copper there is no appreciable tensile strength.

The elongation on the other hand gradually increases until it reaches a maximum at about 70 per cent. copper, after which it slowly decreases until at about 50 per cent. copper it has disappeared entirely. The increase in tensile strength at about 65 per cent. copper coincides with the appearance of the beta constituent. It is hardly visible at 65 per cent., and it is at its miximum at about 54 per cent., which coincides with the maximum tensile strength. The maximum extensibility begins to drop off with the appearance of the beta constituent. When other metals are added to these various groups the effects are very marked; the above remarks refer to chemically pure metals. The addition of lead to any brass alloy causes the alloy to be weakened; it also makes the alloy turn easier, and in the alloys with but 50 per

cent. to 54 per cent. copper, the lead enables a cheap alloy to be formed which can be extruded, and gives very good tensile strength.

The effect of tin is to harden the copper-zinc series of alloys, if it is annealed at a high temperature to cause it to dissolve in the crystals and not be present as a copper-tin compound.

Manganese is added to the 56 per cent. copper-zinc alloys to the addition of 2 per cent. or thereabouts to form English manganese bronze, and also about 25 per cent. aluminium. The iron varies enormously in England, anything from 0.1 per cent. to 2 per cent. In America 2 per cent. iron and minute quantities of manganese is the rule. Iron and manganese are toughening in these alloys, and the aluminium is a deoxidizer, but the purest metals must be used. It is useless making manganese bronze with tough arsenical copper or adding the iron anyhow. Unless it is properly alloyed it will not unite with the brass, and the requisite strength will not be obtained. It is possible to fake the strength of manganese bronze, but such strength, unless in the case of pure metals, is not genuine.

ERNEST A. LEWIS,
Consulting Metallurgist.

Birmingham, England. April 15, 1915.

A REMINISCENT ELECTRO-PLATER

TO THE EDITOR OF THE METAL INDUSTRY:

I read with a great deal of interest in THE METAL INDUSTRY of the proceedings of the American Electro-Platers' Society, and often wish I was close enough to a branch to become a member, but as I am too far away to be an active member I have to content myself with what I can read in your publication.

Being in a reminiscent mood, I am going to tell of the experiences of a plater in the early period of the industry, as I think it would be interesting to the younger element in the business. In the year of 1869 the writer "accepted" a position as apprentice boy in a shop which had just been established in St. Louis, which was styled the Eclipse Plating Works, and consisted of the Boss (a Mr. Hart from Philadelphia), a plater, M. S. Jarvis, two buffers and myself.

The process of nickel plating had just been patented by Dr. Adams and our concern was paying a royalty on all business done; in a short time, however, shops were opened up all over the country and many were operating without paying the royalty, numerous injunction suits were brought and the matter was in litigation for years, until finally the patentees became discouraged and everybody stopped paying royalties.

The method of operating a shop at that time was as follows: The work, which consisted largely of revolvers, tableware, bridle bits, buggy and harness trimmings, etc., were prepared during the day for plating, all articles which had been in use and were rusty or rough were surfaced (as it was called) by the use of a wheel bristle brush, pumice stone mixed with oil being used as an abrasive. The work was then put in a kettle of boiling lye, an ordinary stove being used for the purpose, then in the afternoon the plater would get busy and fill the nickel tank with the work, connect his chemical batteries (Smee cells being used) and the work would be left in all night and removed from the tank next morning. The buffer then tackled the job, using rouge for buffing, and believe me it was some job which fell to my lot—to wash the rouge out of the work.

There were no ready-made buffs in the market at that time, each shop making their own buffs, which was done by buying a bolt of muslin, marking it out the proper size with a pencil, using a disc of steel for a pattern, then cutting one thickness at a time until there was enough to complete one buff, each piece was then folded into V-shape, then the apex of the V clipped off with the scissors to make the hole. The buff was then placed on a brass clamp made of two flanges, one having a threaded hub in the centre; the buff after being made fast in this manner was screwed on the buffing machine, which had a spindle tapering out to a point.

Rouge being very expensive, was discarded later on, being replaced by powdered crocus, which was mixed with water and smeared over the work with a swab; this was later replaced by crocus in stick form. Plating castings for stoves was at that time not thought of, the prices being prohibitive. Perhaps some of the old-timers can recall some things which I have forgotten, if so, would like to hear from them.

S. M. FERGUSON,
Foreman Plater, Great Western Stove Company.

Leavenworth, Kansas, April 15, 1915.

ACCURATE INFORMATION

THE METAL INDUSTRY received a sample of metal with the following letter:

Gentlemen:

We are enclosing a sample of what is supposed to be a yellow brass or dip metal casting. We desire to find out just what this is. Is it a manganese bronze or just a 62-37-1 mixture with a little aluminum? If so, how much? In other words, How, in your opinion, should we proceed to duplicate it? Enclosed also is a self-addressed envelope.

Thanking you in advance for your courtesy and awaiting an early reply, we ramin,

Yours very truly,
Crow Brass Foundry Company,
W. J. / G. J. R. Per WILLIAM JACKSON, Pres. and Mgr.

THE METAL INDUSTRY had its expert analyze the sample and replied as follows:

"The sample is not manganese bronze, but a 62-38 brass containing a little aluminum.—J. L. J."

The Crow Brass Foundry Company evidently wished to be doubly secure in getting the information it set out for, as it submitted the same inquiry with a sample of metal to another journal. The answer, which was published in the other journal, was a sfollows:

"The sample of metal received is not a yellow brass, but what is commonly known as green or low brass. To make the mixture use 75 per cent. copper and 25 per cent. zinc and 2 per cent. of lead if the castings are to be machined. Too much lead will make the castings turn dark in dipping. There does not appear to be any aluminum in the mixture, but if you wish you could add 1/10 per cent. in the following manner: Make an alloy of 1 pound of aluminum and 9 pounds of zinc and add 1 pound of this alloy to every 100 pounds of metal in the pot."

THE METAL INDUSTRY, noticing the second answer which differed so widely from its own answer, wrote to the brass company and asked them from which one they got the metal that they wished to make, and the following answer was then received to this last letter of THE METAL INDUSTRY:

Gentlemen:

With reference to your letter of January 20, we advise that in making the metal we got results from analysis furnished by you.

Thanking you very kindly for the information and courtesies, we remain,

Yours very truly,
Crow Brass Foundry Company,
W. J. / G. J. R. Per WILLIAM JACKSON, Pres. and Mgr.

We would refrain from making any comment as to what would have been the feelings of the brass company had they not received the answer from THE METAL INDUSTRY first, but had gone ahead and followed the advice given by the other journal, as it is an expensive proposition to make up metal mixtures and then find them wrong.

NEW BOOK

EXPORTERS' ENCYCLOPAEDIA—1915. 6 by 8 inches. 152 pages, including index. Bound in boards. Published by the Exporters' Encyclopaedia Company, New York. Price $7.50. For sale by THE METAL INDUSTRY.

This eleventh edition of this work is an indispensable aid to every manufacturer because it enables him to make a shipment to any foreign country in full security against delays, fines, annoyance to customers, etc. It tells him every practical route to every place, whether he can get a through bill of lading, or if not, which is the nearest port to which a through bill of lading can be obtained, whether any Consular Regulations most be observed and the exact cost of same, what the transportation companies require as to bills of lading, payment of freight; it, in fact, posts him as thoroughly in all details as the most experienced exporter.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—We have made considerable Lumen bearing metal which consists of 10 per cent. of copper, 85 per cent. of zinc and 5 per cent. of aluminum. In melting this metal we have considerable dross on same. What would you advise to reduce it? Also what would be the best way to use up the turnings off same?

A.—To make Lumen bronze, make a hardener of aluminum 10 per cent., and copper, 90 per cent., and pour into thin strips. Melt the zinc in a graphite crucible and add the hardener and the rest of the copper, this latter being in the form of thin strips. The turnings may be reclaimed by making a bath of gates, etc., and adding the turnings a shovelful at a time.—J. L. J. Problem 2,133.

BUFFING

Q.—Will you kindly advise us the best method to restore the original lustre to Britannia metal? We suppose this can be done by nickel plating, but we have never been able to nickel plate Britannia metal successfully.

A.—The original lustre may be restored to Britannia metal by the usual methods of buffing, using vienna lime compositions as a polishing medium. If there is very much oxidation upon the surface of the metal, an immersion in a dilute solution of muriatic acid and water for a few minutes will reduce the oxide very readily and make the re-polishing less difficult. The muriatic acid dip should consist of 5 to 10 per cent. of acid and 90 to 95 per cent. water. It is advisable to use a little kerosene oil in connection with the vienna lime polishing composition, as it will assist matters very much.

In nickel plating Britannia metal it is advisable to give the surface a light coating of copper or use a nickel strike. A portion of the regular nickel solution used in a separate receptacle will answer the purpose. It should be heated to 120 degrees. The idea is to cover the Britannia metal surface as quickly as possible and then finish plating in the regular nickel bath.—C. H. P. Problem 2,134.

CASTING

Q.—Could you kindly furnish us with information concerning the manufacture of spelter portable lamp shades? How are these spelter panels cast. What kind of soldering flux is used in this work and if muriatic acid is used what will prevent the forming of a black stain on the work?

A.—The panels for portable lamp shades made from spelter are cast in bronze molds. These sections are then soldered together, being reinforced at the seams by brass or tinned iron wire, or by lap over seams soldered by sweating the solder beneath with blow pipe torches.

The soldering fluid used consists of chloride of zinc; that is, muriatic acid saturated with sheet zinc until the strength of the acid is entirely taken up. It is then mixed with equal parts of glycerine and denatured or wood alcohol. This soldering fluid does not blacken and can readily be washed away with hot water after soldering if at any point it is in excess.—C. H. P. Problem 2,135.

CLOSE-PLATING

Q.—We should be pleased to have you give us some information regarding close-plating silver on steel.

A.—Close-plating is a method that has been used for years in the saddlery hardware business to coat steel parts, such as collar hames, etc., with brass or silver. Later the method was taken up by the automobile industry when brass trimmings were in vogue in order to cover levers, etc., with brass to match other brass parts.

The method consists of applying very thin sheets of soft brass or silver to the steel parts, which must be previously polished down and cleansed. The surface is then tinned with regular half and half soft solder consisting of 50 per cent. lead and 50 per cent. tin. The sheet silver or brass is cut according to patterns which are usually kept in stock for the purpose. One side of the thin sheet of brass or silver is also lightly tinned with the solder. The usual chloride of zinc flux is used for soldering. A little more flux is applied to the tinned steel surface, or the tinned silver or brass surface, and then it is fitted to the articles to be close-plated. Ironing tools made from polished steel are now heated to the melting point or more of the solder. The heated iron is then applied to the brass or silver surface. This application melts the solder, and the brass or silver becomes soldered to the steel, producing what is termed "close-plating." The ironing down is a very important one, and the experienced close-plater can iron down the brass or silver so that it is perfectly smooth. The seams are very closely matched on the underside, so it is scarcely noticeable. After the close-plating is completed the surface is polished or plated in the regular manner. THE METAL INDUSTRY published an illustrated article on close-plating March, 1904.—C. H. P. Problem 2,136.

DIPPING

Q.—I am using plumbers' scrap metal which contains quite a good deal of lead to manufacture plumbers' supply castings and I would like to get up a cheap dip for these castings to bring out a good color.

A.—If you only desire to bring up a red tone to your castings immersing them in the following dip will give them a more copper tone. This solution should be used warm:

Water	1 gallon
Oil of vitriol	1 pint
Sulphate of copper	2 ounces

After immersing the casting for ten minutes or more remove them, wash in cold water and then dry out by the aid of boiling water.

If a bright lustre is required then immerse them for a second or two in a dip composed of the following:

Yellow aqua fortis, 38%	2 gallons
Oil of vitriol, 66%	1 gallon
Muriatic acid	2 ounces
Water	1 quart

After dipping, wash well in water and then immerse in a dip consisting of 4 ounces of cyanide and 1 gallon of water. This will remove any acid stains. Then re-wash in water and dry out in boiling water.—C. H. P. Problem 2,137.

EXTRUDING

Q.—Kindly advise me what is the ideal composition for yellow metal to be extruded, also the allowable limits in composition, both as regards the major constituents of the alloy and also the minor ones, including impurities.

A.—Extruded metal usually runs from 58 to 64 per cent. of copper and 36 to 42 per cent. of zinc, unless the mixture carries some lead, in which case the amount of lead varies from 1¾ to 3½ per cent., which is deducted from the zinc content. Other impurities that may be found in it are small amounts of iron, usually called traces, and may run from .08 per cent. down, and traces of tin, which are due to scrap used for melting. There are cases where extruded metal has been made with as high as 65 per cent. of copper, but we believe this is not general.—K. Problem 2,138.

MAGNETTING

Q.—How may I remove the iron chips from brass chips which also contains some oil? If it were not for the oil I could remove the iron by the use of a magnetic separator. Could you suggest an economical method whereby I can remove this oil leaving the chips in such a condition as to remove the iron by a magnetic separator, or can the iron and oil be removed together? Would it be practical to treat these chips with a hot soap or alkali solution, and finally force steam through them with a little pressure, and then remove the iron by the magnet, or can you suggest a different treatment?

A.—We should think that you would be able to separate the brass and iron chips from the oil by means of a centrifugal separator, after which it would be an easy matter to put the material through a magnetic separator.

This practice has been followed with some success by the brass concerns of the Naugatuck valley of Connecticut, and we believe it would be more economical than the soap or alkali solution process that you mention.—K. Problem 2,139.

MIXING

Q.—Can you give us a mixture of metal, a nickel bronze that would be suitable for casting large valves used on high pressure superheated steam? We cannot use Monel metal, as we are unable to get sound castings. We thought probably we could make a mixture of metal using nickel that would have the required tensile strength, about 65,000, and yet have a very close grain for pressure work.

A.—A number of brass founders who have found it difficult to handle Monel metal because of the high melting point and the trouble in making sound castings have used the following mixture as a substitute:

Copper	80 per cent.
Nickel	10 " "
Tin	10 " "

It has proved satisfactory in valve seats.—J. L. J. Problem 2,140.

Q.—I would like to get a mixture for gear bronze for high speed multiple drill spirals. I use the following mixture:

Copper	15 parts
Straits tin	1 "
Phosphor tin	1 "
Yellow brass	2 "

Also can you tell me how to make yellow manganese. I use the following ingredients, copper, zinc, manganese and aluminum, but I understand there are more.

A.—Your gear bronze would be improved by reducing the amount of yellow brass. If more than a very small amount (2 per cent.) of zinc is present it will cause segregation.

In addition to copper, zinc, aluminum and manganese, there is also iron and tin in manganese bronze. The tin, iron and manganese are melted together to make a hardener. This is added to the copper and then the zinc is added. As this alloy is difficult to mix properly it is best to buy the ingot from an experienced maker.—J. L. J. Problem 2,141.

MOLDING

Q.—In skin drying sand molds where we use a sharp pattern, we find a tendency for the sharp edges of the sand to fall away so that the surface of the castings are more or less granulated. Would you kindly advise us what you consider the best method of preventing this?

A.—Even with a sharp pattern it is well have a good draft and keep the pattern smooth and clean so that the sharp edges of the sand mold are not cracked in drawing. Where trouble is had even with these precautions spray the sharp edges with molasses water or a small amount of a stronger sand may be sieved on the pattern from a rather fine sieve. It is best to keep the heat of the metal down, too, where there is danger of cutting.—J. L. J. Problem 2,142.

PLATING

Q.—Kindly advise how the spotted or marblized effect is produced on tin, such as is seen on match boxes, cans, etc., and which has a crystallized effect similar to galvanized iron.

A.—The snowflakes or crystallized effect noted upon articles made from tin and lacquered in the various tones is produced as follows: Prepare a solution of aqua regia consisting of hydrochloric acid, 3 parts, and nitric acid, 1 part, and dilute with an equal volume of water. Arrange the sheets of tin over a hot water bath so they become slightly heated from the steam arising from the water. Now go over the surface of the tin with a sponge moistened with the acid mixture. The crystallized effect develops immediately. Wash the tin sheets, when finished, in clean water, dry out and then lacquer with colored tin lacquers in any color required.

Lacquers for this purpose may be obtained from any of the lacquer manufacturers advertising in THE METAL INDUSTRY. —C. H. P. Problem 2,143.

Q.—Kindly give me a formula for a nickel-silver solution that will have the properties of nickel.

A.—The following formula for a silver-nickel solution is used by many casket hardware concerns who require only a light hard deposit of the color of silver upon their product.

Solution No. 1.

Silver cyanide	1½ ounce
Cyanide 98-99%	2 ounces
Water	½ gallon

Solution No. 2.

Nickel cyanide	1 ounce
Cyanide 98-99%	1¼ ounce
Ammonium chloride	⅓ ounce
Water	½ gallon

Prepare the two solutions separate and then mix thoroughly. Use silver anodes with the solution or to every three anodes of silver use one anode of rolled nickel which should be as soft as possible. The voltage required should not be less than 2 volts as nickel silver solutions require twice the voltage of a regular silver cyanide solution.

To produce a bright tone to the deposit a little carbon bisulphide may be added in the regular manner as applied to the regular silver solution. Silver and nickel alloys are more difficult to oxidize than the regular silver deposit even when strong hot solutions of potassium sulphide are used. When oxidized finishes are required it is preferable to lightly copper the silver nickel deposit in a regular cyanide of copper solution; then oxidize in a cold solution of potassium sulphide 1 ounce or more to each gallon of water and ¼ ounce of 26% ammonia water will give satisfactory results.—C. H. P. Problem 2,144.

SAND-BLASTING

Q.—Can you give me any information regarding the proper grade of sand to use in a sand blast machine to produce a very fine matt surface in connection with a French bronze finish on bronze articles? Is pumice better than sand? What grade of either sand or pumice should be used for such work?

A.—To produce a very fine matt surface in connection with a French bronze finish we are of the opinion that glass sand will give you the best results. A coarse pumice stone is frequently used for fine matt work, but it would be advisable to try two or three grades of the material to determine which would produce the most satisfactory results.

Silex is also used for the purpose and the grades are similar to pumice stone. In plants where the regular sand blasting is done the fine dust that results from the sand after it has been used a number of times is used, as they claim that this expended sand gives a fine matt finish.—C. H. P. Problem 2,145.

SOLDERING

Q.—Will you kindly advise me of a good mixture for soldering aluminum bronze?

A.—Aluminum bronze may be brazed with an alloy of copper, 52; zinc, 46, and tin, 2, using borax as a flux.

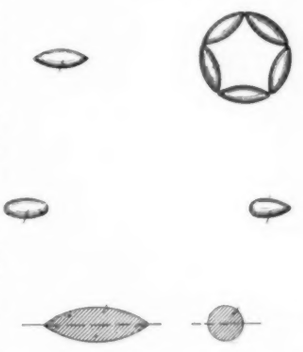
For soldering aluminum bronze jewelry an alloy of gold, 14.30; silver, 57.10; copper, 24.31, and tin, 4.29 is recommended. —J. L. J. Problem 2,146.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY

1,133,368. March 30, 1915. **Polishing Element for Rattling Devices.** T. A. De Vilbiss, Toledo, Ohio, assignor to the De Vilbiss Manufacturing Company, of the same place.

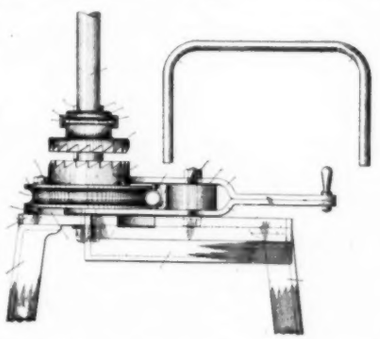
This invention relates to tumbling or rattling devices of the class employed in connection with the cleaning or polishing of small articles, and has particular reference to the formation of the loose rattling or tumbling parts or elements which have polishing or cleaning contact with the articles. The invention is not restricted to such use, however, as it may be used in any connection for which it is adapted or appropriate.



The object of the invention is the provision of a rattling or tumbling element of the character shown in cut, which is other than of true spherical form, whereby it may adapt itself to the different curvatures, or to openings, recesses, or the like, of different sizes and shapes, and to irregularities in the articles being operated on, thus making the finishing of articles with rattling elements of this class more rapid and efficient than is possible with elements of the spherical type.

1,133,401. March 30, 1915. **Tube-Bending Machine.** R. F. Redding, of East St. Louis, Ill., assignor to St. Louis Bed and Manufacturing Company of the same place.

This invention relates to machines for bending metal tubing into various shapes and has for its prime object the production of an improved machine of the character described which shall be largely automatic in operation and by the aid of which the output of the operator for a given period may be greatly increased with a consequent reduction in the cost of production of various articles.

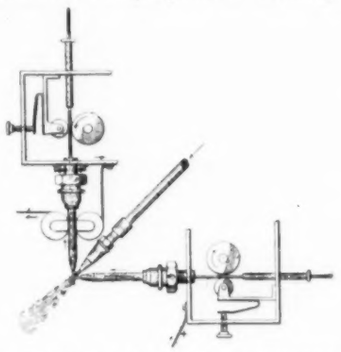


The writer claims:

1. A machine of the character shown in cut, comprising a table, a disk rigidly fixed thereon, a groove formed in the periphery of said disk, a toothed annular member revolubly mounted upon said disk, a lever projecting laterally from said member, a roller secured to said lever, a block removably disposed between said disk and roller, a groove formed in said block disposed opposite the groove of said disk and corresponding to the size thereof, a revoluble shaft vertically projecting through said member, a toothed clutch slidably mounted upon said shaft and revolving in unison therewith, devices for bringing said clutch into engagement with said member, means for automatically releasing said clutch and block, and mechanism for driving said shaft.

1,133,508. March 30, 1915. **Method of Spraying Fusible Substances.** Max Ulrich Schoop, of Zurich, Switzerland, assignor, by mesne assignments, to Metals Coating Company of America, of Boston, Massachusetts, a corporation of Massachusetts.

This invention relates to the spraying of metals or other fusible substances on to a base for the purpose of forming either adhering or separable coatings which are impacted thereon as described in a former patent application, Serial No. 52800, filed April 1, 1910, patented February 9, 1915, No. 1,128,058*, and the present application has for its object to provide a simple method, as shown in cut, of melting and simultaneously spraying the metal or fusible substance.

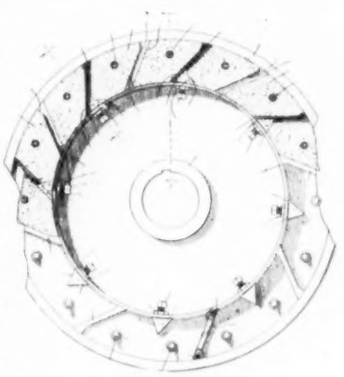


This invention consists in introducing the fusible substance or metal into a zone where it is immediately melted or fused by an electric current conducted to the zone by the unmelted portion of the said fusible substance and spraying and impacting the fused portion immediately it has been fused.

*See THE METAL INDUSTRY, March, 1915.

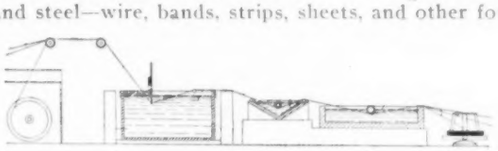
1,133,475. March 30, 1915. **Grinding Wheel.** E. R. Hyde, Bridgeport, Conn.

This invention has for its object to produce a simple and inexpensive grinding wheel especially adapted for face grinding, which shall comprise a flanged carrying disk, a plurality of grinding blocks of novel configuration and means for adjusting the blocks so that the blocks may be practically used up, thereby avoiding waste and greatly reducing the cost of the operation of grinding. With these and other objects in view the writer has devised the novel grinding wheel and grinding blocks therefor, which is shown in the cut.



1,133,628. March 30, 1915. **Galvanizing Wire, Hoops, Sheets and the like.** H. H. Field, of Grappenhall, Mark Howarth, of Latchford, and E. A. Atkins, Liverpool, England.

This invention has reference to the covering or coating of iron and steel—wire, bands, strips, sheets, and other forms of



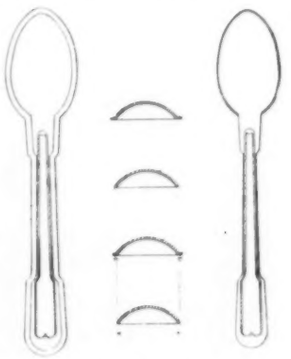
articles, with zinc, by what is known as the "galvanizing" process; and it has primarily for its object to provide improvements in connection with the process of hot galvanizing, by which the quantity of "dross" and oxide formed in the process is reduced or eliminated, at the same time this effect is accomplished with very little expense.

The patent covers, in galvanizing steel or iron wire, strips, bands, sheets and the like, the process as shown in cut, con-

sisting of converting oxid of iron on its surface, to chlorid of iron, by subjecting it to the action of dilute hydrochloric acid; then removing the chlorid of iron so formed by subjecting its surface to an electrolytic action, by passing it through an electrolytic bath of chlorid of zinc, and also simultaneously thereby coating its surface with a thin coating of zinc, by electrolytic deposition; and finally immersing this iron chlorid free and zinc coated iron or steel article in molten zinc.

1,133,775. March 30, 1915. **Process of Producing Polished Spoons, Forks and Other Metal Articles.** Arthur Wilgin St. Ouen, France.

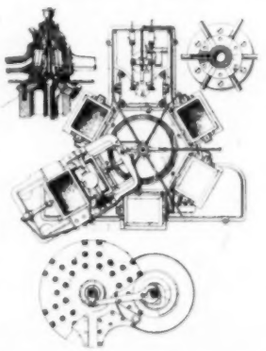
The object of the present invention is to substitute, for the polishing operations hitherto employed on metal articles, a method which shall enable the polishing to be effected with greater rapidity and certainty than has heretofore been possible, which shall avoid liability of spoiling the sharpness of the design, which shall not call for the exercise of special skill on the part of the workman, and which shall therefore possess the advantage of being economical.



In carrying out the present invention, the polishing is effected, not by friction as heretofore, but by heavy pressure. The various stages of operations are shown in the cut.

1,134,396. April 6, 1915. **Molding Machine.** Alexander McCarte, Newark, N. J., assignor to the Singer Manufacturing Company of New Jersey.

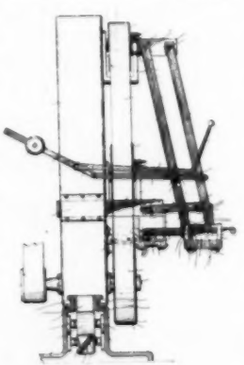
This invention has for its object to provide an effective and conveniently controlled and operated apparatus for automatically producing sand molds.



The present invention is embodied in apparatus shown in cut, comprising a traveling flask-support with means for imparting to it operative movements with periods of rest whereby the movement of a flask supported thereon is interrupted at a plurality of stations in each excursion of the support from initial position, with successively acting flask-filling, tucking and striking-off means disposed at one of said stations and mold-compressing means disposed at another of said stations.

1,134,508. April 6, 1915. **Grinding and Polishing Machine.** John C. Blevney, of Newark, N. J.

This invention has reference, generally, to improvements in grinding and polishing machinery; and the said invention relates, more particularly, to a novel construction of machine for grinding and polishing the rough uneven surfaces of metal castings, and the like.

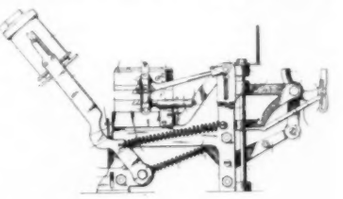


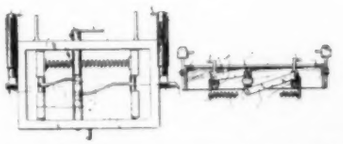
The invention has for its principal object to provide an efficient construction of apparatus, shown in cut, adapted to automatically grind and polish the rough uneven surfaces of metal castings, and the like, to provide the same with an apparently smooth evenly finished surface, without, however, unduly grinding off the high spots or points forming the surface inequalities of the said castings, so that said castings are weakened or rendered too thin by the loss of metal. To accomplish this end there is provided a novel means for pressing the abrading elements of the machine in contact with all portions of the area of the unequal surface of the castings with substantial uniformity.

1,135,120. April 13, 1915. **Molding Machine.** Archibald M. Loudon, of Elmira, and John Gow, deceased, late of Schenectady N. Y., by Archibald M. Loudon, of Elmira, N. Y. and Horace W. Philbrook, of Schenectady, N. Y., administrators.

This invention relates to molding machines and more particularly to a type of rockover molding machine.

The main object of the invention is to provide a rockover molding machine, shown in cut, wherein the mold, flask or core box may be quickly mounted upon the rockover frame and be secured in place by automatically acting retaining means which will accurately center the mold, flask or core box with relation to the ram, and hold it securely in place when it is being filled.

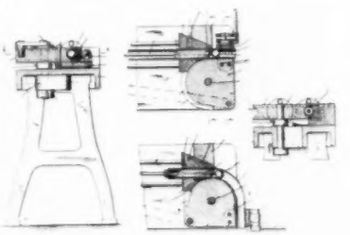




A further object is to provide in such a machine retaining means which will automatically adjust itself to co-operating members on the mold, flask or core box, and set and remain fixed in any position, thus compensating for irregularities in different molds, flasks and core boxes and wear occurring thereon.

1,135,875. April 13, 1915. **Tube Bending Machine.** L. H. Brinkman, Glen Ridge, N. J., assignor to Baltimore Tube Company, Baltimore, Md.

This invention relates to tube bending machines, and one of the objects of the invention is to provide a durable, efficient and smoothly-operating machine for bending tubes without causing flat spots therein.



Another object of the invention is to provide a tube bending machine, shown in cut, which is practically automatic in its cycle of operation, so that it may be readily controlled and operated with little effort or attention on the part of the attendant.

1,136,909. April 20, 1915. **Process of Making Alloys.** Edward D. Gleason, of New York, N. Y., assignor, by mesne assignments, to Neu-Metals and Process Company, of Long Island City, New York, a corporation of New York.

This invention relates to the purifying and casting of copper and alloys thereof; the object of the invention being to eliminate oxygen and other gases which if allowed to remain render such castings porous.

The inventor says: "In practising my invention I incorporate boron in copper, as graphite exists in cast iron, by fusing them in a crucible, free from impurities, with a flux consisting of native calcium fluorid and fused boracic acid. For instance, in a crucible of magnesite, or graphite free from arsenic balls, I put three parts of calcium fluorid, and, on top of that, one part of fused vitrified boracic acid. I then fuse the same, preferably in an oxy-hydrogen furnace of ordinary commercial type, until the fused mass of said two ingredients has reached the proper consistency; which is manifested by dense fumes of boron fluorid arising from the crucible. I then pour into said fused mass molten copper at a temperature of about 2,500 degs. F. or higher. Thereupon, the boron fluorid permeates the molten copper, and when the latter is cooled the boron exists therein as graphite exists in cast iron.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

CORCORAN TANKS

The tanks shown in the cuts are the latest developments in pickling, galvanizing and plating tanks. These tanks are designed for holding acid solutions and are not lead lined, this having been found to be unnecessary. Tanks of this kind are made to order to conform with the particular requirements of the service to which they are to be put. For example, if the solution is not more than 10 per cent. in strength, and the depth of the tank is to be 2 feet or less, selected yellow pine can be used of 3 inches, dressed to 2¾ inches. Such a tank is shown in Fig. 1, which has Corcoran splined joints flushed with a special compound. If stronger solutions are used and tank is long and deep, then it is made of selected pine 4 inches thick, dressed to 3¾ inches, which is entirely satisfactory for the purpose. Fig. 2 shows a Corcoran tank used for galvanizing work, which is made also of yellow pine, but of 6 or 10-inch thickness, and is made of special construction. Further particulars as to sizes and prices of these tanks can be had from A. J. Corcoran, Inc., 11 John street, New York.

FIG. 1. CORCORAN "ACID" TANK FOR PLATERS.

TRI B. BRAND SULPHURET

The C. G. Buchanan Chemical Company, manufacturers of chemicals for industrial purposes, of Cincinnati, O., have the following to say about their Tri B. Sulphuret:

"We might parallel this product with sodium cyanide. A plater wants this because he obtains more cyanogen per pound than with the cyanide mixture or cyanide of potassium, and it is the cyanogen he wants for his purposes not the potassium. It is so with our product; it is the combined sulphur which does the oxidizing, and the more the percentage of combined sulphur, the better the product for oxidizing purposes.

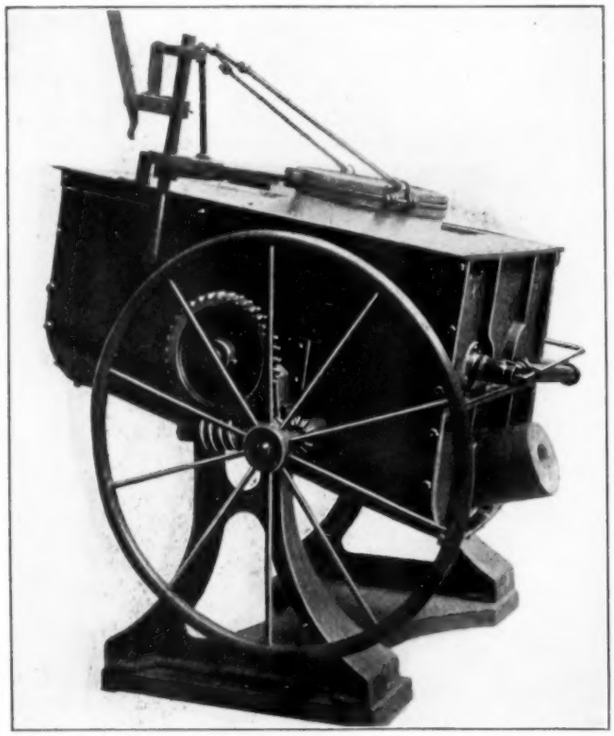
"Potassium and sodium form a trisulphide, but the trisulphide of sodium is not as efficient an oxidizing agent. By an original process we have been able, by a trituration of determined proportions of alkalies, to produce a sulphuret that conforms to a pentasulphide. In other words, we give the plater a product that is 127 per cent. on a basis of commercial liver of sulphur. Further than this, the finish is a better black and is of such texture that it is not necessary to buff off all the base copper in order to spot the work, as is the case with some sulphuret of potassium that has been sold.

"In the last two years we have increased our average monthly output from 300 pounds to 7 tons and we number among our consumers some of the largest corporations in the country."

FIG. 2. CORCORAN GALVANIZERS' DIPPING TANK.

TILTING REVERBERATORY FURNACE

In order to bring the advantage of mobility to the reverberatory furnace, the Monarch Engineering and Manufacturing Company, of Baltimore, Md., has designed and built a tilting reverberatory,



TILTING REVERBERATORY METAL MELTING FURNACE.

views of which are shown in the accompanying photographs. These furnaces are built in several sizes, with capacities varying from 500 to 2,500 pounds per heat. The fuel used may be either oil or gas, two burners being placed in each furnace. The necessary air inlets are properly provided for, and there is a discharge opening through which the contents may be poured when the furnace is tilted, a large handwheel and the requisite gearing being provided for the latter purpose.

THE SAME FURNACE WITH THE COVER OPEN.

To conserve and concentrate the heat an insulating layer of sheet asbestos is placed next to the shell. Inside this is the refractory furnace lining. The top is formed of heavy molded refractory material, and there is no metal near the fire chamber. A swing-aside cover is arranged at the top or charging door. At the rear there is a door, heavily lined with fireclay, for cleaning the furnace or skimming slag during refining. The device is applicable to all reverberatory furnace uses and is more convenient to operate than the usual stationary type. Air pressure from fan or blower at 6 to 16 ounces. Further information regarding this furnace may be had by corresponding with the above firm.

COLEMAN PRODUCTS

Some new apparatus of the Coleman Foundry Equipment Company, of Cleveland, Ohio, include the following:

The Coleman squeezer, shown in the cut Fig. 1, is a very simple machine, consisting of a skid for carrying the flask and an overhead device, operated by a lever, for doing the squeezing. There is a vertical back piece bolted to the wall or post; to this is bolted the skid at the right height for the molder; a diagonal brace runs from the outer end of the skid down to the back piece. An overhead lever connects with a cross shaft which has

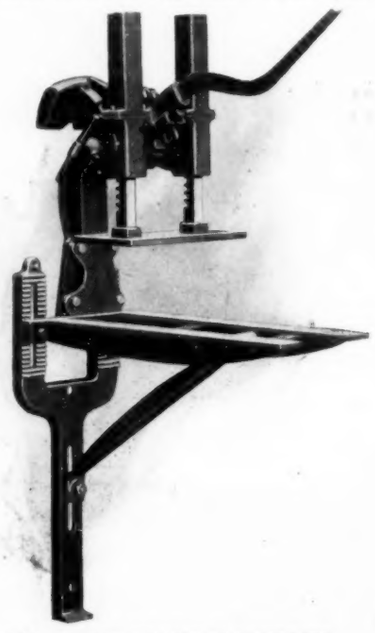


FIG. 1. THE COLEMAN SQUEEZER.

a steel gear at each end engaging with two vertical racks which are fastened to the platen or presser head.

There is a slotted steel wheel which is keyed to the middle of the cross shaft; a lug which drops into any one of the slots connects the handle to the cross shaft; after setting the head at the right height, the lug is dropped into a slot in the middle wheel. The skids, racks and underside of platen are machined; the racks are babbitted and have dust guards. The height from top of skids to underside of platen is 12½ inches; the machine will take a flask up to 16 x 18 inches; the total pressure is about twenty times the amount of power applied; the platen is 8½ x 15½ inches.

The machine is well built, simple, cannot get out of order, must always squeeze level and leaves a clean floor space underneath for the sand. The overhead lever is very easy to work and more power can be applied than with a horizontal pull.

This machine is sent out on thirty days' trial; all it costs is the freight one way, in case the buyer does not want to keep it.

Domestic shipping weight	325 pounds
Foreign shipping weight	337 pounds
Size of package boxed for export	18″x20″x42″
List price F. O. B. Cleveland	$50.00

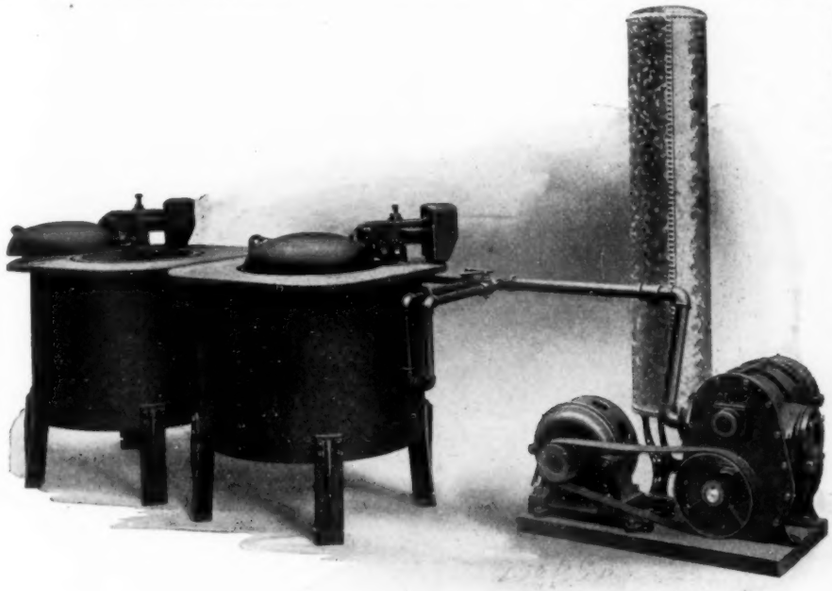


FIG. 2. COLEMAN ALUMINUM FURNACES.

Fig. 2 shows a pair of Coleman aluminum furnaces which have the following specifications:

Gas or oil, cast iron pot.

Pot holds about 300 pounds melted metal.

Capacity gas: 12-1,500 pounds in 10 hours.

Capacity oil: 15-2,000 pounds in 10 hours.

Height, 33 inches; diameter shell, 35 inches.

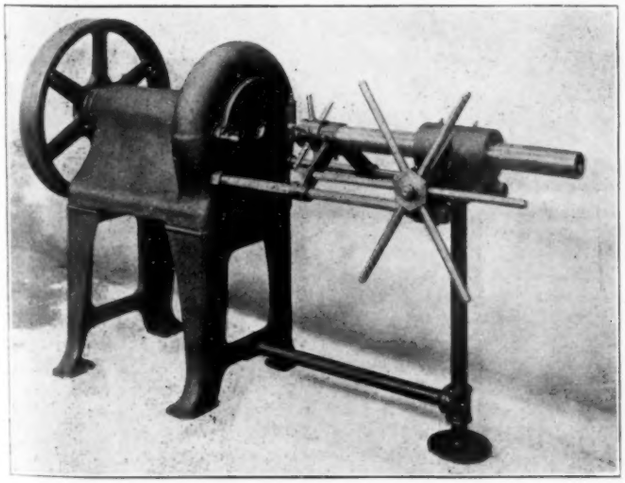
Shipping weight, 1,700 pounds.

Set on floor or in pit.

The prices and catalogues address Coleman Foundry Equipment Company, Cleveland, Ohio.

ROTARY SWAGING MACHINE

The photograph shows a rotary swaging machine equipped with a new feeding-in attachment which has just been brought out by the Standard Machinery Company, Auburn, R. I. The purpose of this attachment is to feed in long bars of tubing or rod, either copper or brass, for reducing the entire length of the bar, or swaging any particular portion of it. The large spanner wheel shown at the extreme right is for feeding in the spindle of the attachment; the spanner wheel shown in the center of the photograph on the spindle operates over a spring collet with conical nose; the bar is put through from the rear of the spindle, which is shown at the extreme right of the photograph, and is clamped tight by the chuck on the opposite end of the spindle which is controlled by the spanner; the large spanner wheel operates the pinion which meshes in the teeth that are cut on the under side of the spindle. An attachment of this type will have a very extensive field; it can be used not only for the reducing of brass, bronze and steel tubing, but also for the swaging of special forms.



ROTARY SWAGING MACHINE WITH NEW FEEDING ATTACHMENT.

Furthermore, it will accommodate regular work that is now fed in by the operator by hand, thereby saving the operator considerable of the jarring and other vibration that a swaging machine transmits.

The attachment shown in this particular cut has been brought out for the No. 3 machine which takes stock 1¾ inches diameter and smaller. It is intended to bring out attachments for the No. 4 machine which takes stock 2¼ inches and smaller, and for the No. 5 machine which takes stock 4 inches and smaller.

DIXON'S WONDER CUPELS

The Joseph Dixon Crucible Company, Jersey City, N. J., have put on the market what they term "Dixon's Wonder Cupels." These are made in three sizes, 1¼, 1½ and 1¾ inches in diameter.

These cupels will be found to be a veritable joy to refiner and assayer. They are not only strong and handable, but the absorption of silver into the cupel is much less than with cupels made from bone ash, when used under similar conditions. They are made of such strength that they will not break in handling, and, in fact, they are just what the assayer has for years wished for. Packed in lots of 100, 500 and 1,000.

The foreign manufacturing districts where clay and sand crucibles are made are in so deplorable a state at present that it has been a question for some time past if it would be possible for them to fill the demands of our country's laboratories and refiners on these necessary articles at all. The Joseph Dixon Crucible Company have now yielded to the repeated urgings from the users of assay crucibles, scorifiers and goods of a like nature so that at present they have a fairly complete line of this class of goods. So far the sale has not been of so great a volume that they have been able to compete in price with foreign makers, but as scarcity increases and larger orders are secured, there is little doubt but that as low, or possibly lower, prices can be made than imported goods of a similar nature now sell at.

NEW NICKEL PLATING METHODS

G. Heger, proprietor of the Brooklyn Nickel Works, 420 West Twenty-seventh street, New York City, has developed some new labor saving methods and appliances for nickel plating stove and other castings, which he states have proved so successful in reducing costs in his own plant that he has decided to offer them to the trade. He will install these appliances and methods for any responsible plating and polishing shop without any expense to the owner, provided the latter will agree to turn over to him the net amount saved during the first three months' operations.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN ELECTRO-PLATERS' SOCIETY

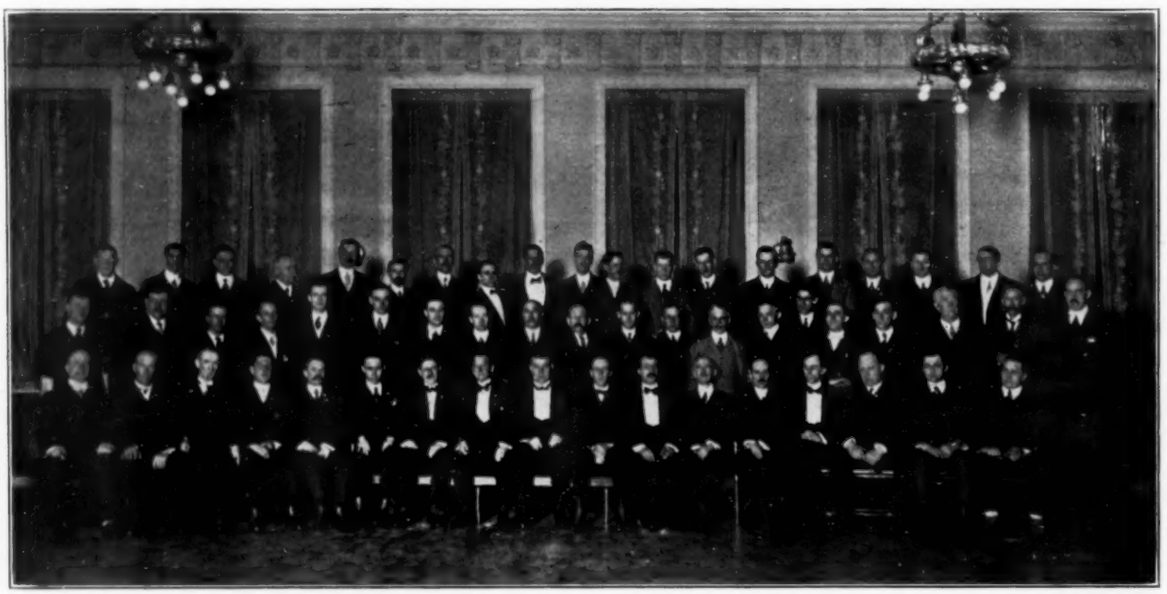
New York Branch held their regular monthly meeting at 258 Pearl street, New York City, on April 23, at which an interesting paper on "The Deposition of Cobalt" was presented. Thomas B. Haddow was elected as delegate to represent this branch at the annual convention to be held in Dayton, Ohio, June 3, 4 and 5, 1915. An open meeting of the New York Branch will be held June 11 and the annual outing on Sunday, June 20, at the Glenwood Hotel, Long Island, N. Y.

Bridgeport Branch.—The banquet of this branch held at the Stratfield Hotel, Bridgeport, Conn., on Saturday evening, May 1, proved to be a great success, though not as largely attended as had been anticipated by the Banquet Committee. After the dinner had been served, Mr. Stratton, president of the Bridgeport branch, thanked those present for having attended. He then introduced Mr. Joannis, who acted as toastmaster. After a few brief remarks Mr. Joannis introduced as speakers Mr. Barnard, Mr. Poland and Mr. Dabolt, all of whom made some very interesting remarks about the society and plating industry in general. Mr. George B. Hogaboom, Past Supreme President of the society, was then called upon and responded with an exceptionally interesting talk, covering very thoroughly the past, present and future of what had been and should be accomplished by the A. E. P. S.

Cleveland Branch.—The first entertainment given by this branch was held at the Pythian Temple, Saturday night, April 24, 1915. There was a large attendance of platers, a number coming from out of town. President W. D. Scott, who acted as toastmaster, made the welcoming speech, setting forth the object of the affair, after which he introduced H. J. Ter Doest, who read a letter from Supreme President J. H. Hansjosten. Other addresses were made by Messrs. R. H. Sliter and A. D. Sopher. After an elaborate lunch was served music was furnished by Phil. Barker and E. B. Boyle, aided by the Chambers orchestra. A large number of the platers exhibited samples, which aroused a lot of comment as to their production. A number of the platers in attendance handed in their application for membership. The branch is steadily growing, and hopes to hold many more of these "get-together" meetings.

Milwaukee Branch.—This branch will hold its first banquet at the Maryland Hotel, Fourth street near Grand avenue, Milwaukee, Wis., May 22, to which they invite all those interested in electro-plating to attend. Able speakers, including Prof. C. F. Burgess and Dr. Oliver P. Watts from the University of Wisconsin, Madison, Wis., have been procured, and the committee is working hard to make this banquet a success.

Dayton Branch.—The banquet which this branch held at the Algonquin Hotel on April 10, is reported to have been a notable event. This was the second annual banquet of this branch and was given for the manufacturers and employers of platers and about fifty were present when the order was given for the festivity to begin.



BANQUET OF BRIDGEPORT BRANCH AMERICAN ELECTRO-PLATERS' SOCIETY, HELD AT BRIDGEPORT, CONN., MAY 1, 1915.

The toastmaster was Walter Fraine, president of the Dayton Branch, and he, in his usual clever manner, introduced the various speakers and made a brief address in which he touched upon the work and object of the American Electro-Platers' Society. Supreme president, Col. J. H. Hanjosten, of Kokomo, Ind., was the first speaker, and his subject was the "Relation of Educational Societies to the Manufacturers," and his talk made a lasting impression upon all present. Forrest Hartzell, of the Dayton Branch, presented a paper on "Electro-Cleaning," which attracted considerable attention and caused some interesting discussion.

A pleasant diversion to relieve the monotony of serious things was introduced when Mr. George Wills, accompanied by Miss Maudie Moore, of the Alice Becker Miller School of Music, sang a bass solo entitled "A Song of Steel," after which Mr. Wills was forced to respond with an encore entitled "A Dream."

Other speakers at the banquet were Ohmer D. Stephans, of the Dayton Branch, on "Preparation of Iron Castings for Plating," a subject which Mr. Stephans covered in great detail. He was followed by Mr. Williams, chemist of the National Cash Register Company, who referred to the "Value of the Chemist to the Modern Plater." A paper on the "Preparation of Brass, Copper

and All Other Non-Ferrous Metals for Plating" was read by George Lantz. "The Relation of the Manufacturers to Educational Societies" was treated by W. E. Best, superintendent of the National Cash Register Company, and his talk aroused a great deal of enthusiasm due to the fact that he brought out the point that the manufacturers of Dayton and vicinity were in hearty accord with the workings of the society. Other speakers were J. K. Scandrett, of the Egry Register Company; Mr. Hendricks, of the Computing Scale Company, and Mr. Chas. Buchanan, of Cincinnati, Ohio.

The banquet then broke up after the platers present had been strongly urged to attend the coming convention, the preparations for which are described in the fore part of this issue of THE METAL INDUSTRY, and to help make this the best convention in the history of the American Electro-Platers' Society.

METAL FINISHERS EQUIPMENT ASSOCIATION

An organization composed of the leading manufacturers of platers' and polishers' materials and equipment has been incorporated under the laws of the State of New York, as the Metal Finishers' Equipment Association.

The object of the association is to promote better feeling between the manufacturers and the consumers of their products, to correct trade abuse, obtain better credit information and provide for the arbitration of disputes amongst members and between members and customers.

The certificate of incorporation and constitution states:

"The objects of this association shall be to foster trade and commerce; to reform abuses existing and arising in the trade; to secure freedom from unjust and unlawful exactions; to diffuse accurate and reliable trade information as to the standing of merchants and other matters; to procure uniformity and certainty in the customs and usages of the trade; to settle differences between its members; to promote an enlarged and more friendly intercourse between business men and to secure the advantages obtainable through mutual co-operation, all of which shall be done in harmony with the State and Federal laws."

The necessity for such an organization has been strongly felt in the metal finishing trades, and the organization of this association is in line with similar action already taken by the electrical, jewelers', machinery manufacturers, textile, and other trades. It is entirely in line with existing laws and tends towards mutual protection and to the better education of members in trade usages and conditions. The society, while new, is already on a successful basis and has a growing membership that already includes many of the largest supply houses.

The officers and directors of this association are: President, R. D. Foster, Hanson & Van Winkle Company; vice-president, H. L. Zucker, Geo. Zucker Company; treasurer, A. P. Munning, Munning-Loeb Company; secretary, Franz Neilson, 80 Wall street; A. H. Bogani, Foot Manufacturing Company; B. H. Divine, Divine Bros.; E. D. Kolyer, New York Buff Company; C. F. L'Hommedieu, C. F. L'Hommedieu Sons Company; P. H. McAuliffe, General Supply Company; Martin O'Connell, Bennett-O'Connell Company; supervisor, Franz Neilson, 80 Wall street, New York.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

DEATHS

CHARLES E. WETMORE

Charles E. Wetmore, treasurer and director of the American Hardware Corporation, of New Britain, Conn., died at his home, 22 Grove Hill, at 3:30 p. m. Monday, April 26, after an illness of about four weeks. The funeral was held at the home on Wednesday afternoon, April 28, at four o'clock.

CHARLES E. WETMORE.

Mr. Wetmore entered the service of P. & F. Corbin as a boy of sixteen on April 1, 1871. When the American Hardware Corporation was formed in March, 1902, Mr. Wetmore was made the secretary. On January 1, 1912, he became the treasurer of the American Hardware Corporation, a position he held at the time of his death. He was a director of that company from its formation.

At the time of his death he was president of the New Britain Club. He was a member of the Country Club, the New Britain Golf Club and of other local social organizations, a thirty-second degree Mason, and past master of Centennial Lodge, A. F. & A. M. He was president of the Hartford Choral Society, and took an active part in its work. He was also a director of the New Britain Trust Company. He is survived by his wife, who is a daughter of Andrew Corbin, one of the founders of the Corbin firm; a daughter, Margaret, and a son, A. Corbin Wetmore, who live in the Wetmore home, and also by two married daughters, Mrs. Lillian Wetmore Hart, of Hartford, and Mrs. Gertrude Wetmore Merriam, of Milton, Mass. He has two brothers, Harry S. Wetmore, of this city, and Frank K. Wetmore, manager of the Buckingham Hotel in Washington.

E. H. MUMFORD

Edgar Huidekoper Mumford, well known for his contributions to the foundry industry through his inventions in molding machines, died April 18 at his home at Plainfield, N. J., aged 53 years. Only about a month ago he re-established the E. H. Mumford Company, at Elizabeth, N. J., after 15 years spent elsewhere in the business. Mr. Mumford was born at Groton, Mass., September 20, 1862, and was graduated from Harvard College in 1885 and from Massachusetts Institute of Technology in 1886. He was a member of the American Society of Mechanical Engineers and of the Engineers' and Machinery Clubs of New York. He leaves a widow, two sons and two daughters.

EDGAR H. MUMFORD.

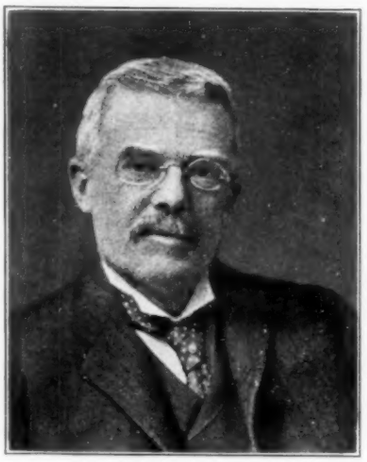
THOMAS L. FOWLER

As announced in THE METAL INDUSTRY for April, 1915, Thomas L. Fowler died at his home in Richmond Hill, N. Y., March 31. Mr. Fowler was about sixty-three years old, and began his business career in 1872 as a clerk with the Ansonia Brass and Copper Company, Ansonia, Conn. He afterwards became associated with the Aluminum Bronze Company, of Bridgeport, Conn., for the past twenty years has been the New York selling agent of the Detroit Copper & Brass Rolling Mills, Detroit, Mich. Mr. Fowler was one of the best known brass men in the country. He leaves a widow and one child.

THOMAS L. FOWLER.

FREDERICK DIETZ

Frederick Dietz, president and treasurer of R. E. Dietz & Co., lantern and lamp manufacturers, 60 Laight street, New York, died suddenly at his home in New York City, March 31. Mr. Dietz was sixty-seven years old, and he is survived by a brother, J. E. Dietz, and a sister. He was a member of the New York Athletic, Union League and Hardware Clubs. He was an enthusiastic horseman, and owned some famous trotters and pacers. By his will just probated, Mr. Dietz remembered every employee of his company, numbering about 600, and made specific bequests to many of them.



FREDERICK DIETZ.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

MAY 3, 1915.

Last month's outline of conditions hereabouts in this column has been proven correct by the development of the month of April. There has been a steady, healthful return of volume in domestic orders. Factories whose business is not affected by the old-world war are gradually getting back to normal conditions and for some there is such prosperity that they are not backward about predicting a sure and profitable return of prosperity to all industries in this section of the country, regardless of the prospects for peace abroad. Domestic business continues to be remarkably low, as to volume, but the condition is healthy, the volume increasing, the business financially solid. War business is still running toward high tide, but that it is in any way a deterrent on domestic prosperity is not apparent and rumors to the effect that brass makers are showing preference in filling orders in favor of the belligerent nations at the expense of domestic customers seems wholly without foundation. THE METAL INDUSTRY correspondent has made careful inquiry and finds no evidence of the slightest foundation for such reports.

Here are some brief interviews with Waterbury manufacturers on the conditions of business at the end of April:

Supt. William J. Larkin, of the Waterbury Clock Company: "A marked improvement is taking place in the watch department. The employes in this department are now working five days a week instead of four, with chances of improvement later on. In the clock department our men are on full time and have all the work they can handle." It is but a short time ago that the situation in the watch business was very doubtful because of the large quantities of stock on hand and the lack of the new orders. Clock business has been slow for months—ever since the effect of the new tariff began to be evident.

William E. Fulton, president of the Waterbury Farrel Foundry & Machine Company, said: "Business has picked up remarkably, according to my views. Our plant is enjoying the best conditions in years. Our men are all working full time and on four nights a week we have night shifts until 9 o'clock. We may be obliged to stop the night portion of our work shortly because of the warm weather, but our day work will continue busier than ever. Few people realize what large orders have been received by American foundries and machine shops since German products have been barred from this country. Our local factories seem to have profited considerably by the war and I should say good times are at hand. We will be running full time for at least six months to come."

Martin H. Brennan, president of the E. J. Manville Machine Company, said: "We are doing fine and our employes are busy every minute. While we have no all-night force working at present, this is due mainly to the competent day force in our employ. We have large orders at hand which will keep our plant running throughout the entire summer and into the fall. I can attribute our boom directly to the war. Conditions on the other side have boosted conditions in the machine business in this country wonderfully. A great deal of machinery used in the United States has been obtained from Germany, but since the outbreak of the war, the importing of German products has ceased and American machine manufacturing shops have received large orders in place of the German shops. Then, again, there are many factories supplying munitions of war to the powers at war and they require extra machinery for their work. We are quite satisfied with conditions at our plant and prospects for the remainder of the year are bright."

John A. Coe, treasurer of the American Brass Company, reports business satisfactory in the plants of this corporation. There is no night work to speak of, but there are full forces at work on full time in the Benedict & Burnham branch of the company and full time in practically all departments of the other branches. There is not a capacity payroll by any means, but there are more employed now than a month ago and present business conditions are considered satisfactory by the company.

J. Hobart Bronson, president and treasurer of the Oakville Pin Company, said: "We are not working on full time, but conditions have improved since a few months ago. The war is immaterial to us. It has not boosted nor decreased our business. It is quite possible that conditions in our line will continue to improve during the coming months."

J. R. Smith, president of the Waterbury Button Company,

said: "In spite of the fact that our domestic trade is unusually small, we are running on full time and improving day by day. The orders from merchants throughout this country are plentiful but not of large quantity. Our agency in London is doing exceptionally well. I believe we shall be on full time throughout the summer and if the domestic trade shows improvement we have nothing to worry about for some time to come.

The Scovill Manufacturing Company and the Chase Rolling Mill Company are exceptionally busy on war orders. The Scovill Company will soon have another large addition to their plant, the building having been begun already. It was made necessary by the large volume of special orders since last August. Domestic business continues low in the Scovill plant, but orders are gradually growing. The same condition, in general, is found in the business of the Chase company.

With the smaller manufacturing plants there is a noticeable spirit of optimism, due almost wholly to the demand for staple goods or for specialties on which they have built up a reputation. Orders for automobile goods continue to come in strong, from such companies as buy supplies here. This is a large factor in the business of many local plants, for there is a great demand for brass and kindred metal from all the automobile factories, while parts of various types of automobile engines are produced here. There is a big demand for very fine brass sheets and this has greatly increased the business of some of the smaller factories hereabouts. They buy fine sheets from the large factories, roll them down to much finer sheets, and these seem to be in great demand at high prices.

Novelties are enjoying only a fair demand, but the prospects in this, as in other lines, are good and indications favor an early improvement.

It is characteristic of the domestic orders now being received, that they are conservative, but also cash or as good. Business men are keeping strictly within their means, but that their business is expanding is clearly demonstrated by the expansion of their orders for metal wares.—F. B. F.

BRIDGEPORT, CONN.

MAY 3, 1915.

With the $5,000,000 plant of the Bridgeport Arms Works still a fresh topic for conversation in this city, comes the news that the Bridgeport Projectile Company, another war-born industry, is to erect another mammoth plant. Rush orders of ammunition, amounting to $500,000, will be executed as soon as the new concern can move into its home, which is to be constructed on a newly purchased tract just south of the East freight yards, bounded on the west by Union avenue and on the east by Hollister avenue. Contracts for $500,000 worth of equipment for the new plant have already been let. The utmost secrecy obtains as to the identity of the financial men behind the new concern, which made its appearance on the horizon in the same breathless, powerful manner as the Arms works. The location of the new plant makes it a neighbor of the Remington Arms-Union Metallic Cartridge Company, which is in turn a neighbor of the mammoth new plant of the Bridgeport Arms Works, to be called the Remington armory. The Projectile company has opened temporary offices here in the Security building under the management of J. C. Knight. What the significance of its organization is remains a mystery, but there is a general belief that Uncle Sam has an intense interest in its erection.

Manufacturing multiplication is coming so rapidly that the people of the city are dazed. Hardly a day goes by but the announcement of some big enterprise is made. The Lake Torpedo Boat Company, which has many contracts for submarines for the warring nations, and which is soon to begin the building of two vessels for the United States navy, has purchased 27 lots adjoining its factory on Seaview avenue, and will proceed at once to treble the size of its plant.

Meanwhile the master stroke of erecting a plant of more than 500,000 square feet of floor space within a few months is being rushed at the Bridgeport Arms Works. Five of the 13 five-story brick and steel buildings, 272 by 68 feet, are now towering high in the air, while the others are in various stages of construction. The size of the new plant may be judged by the fact that eight miles of limestone window sills have been ordered by the James T. Stewart Company, chief contractors. The news that the new plant was to be called the Remington armory convinced the city of the rumored connection between the new concern and the Remington Arms-Union Metallic Cartridge Company. The 500,000 square feet of floor space in the new plant added to that of the Remington Arms-Union Metallic Cartridge Company, which is itself spreading out all over the northeastern part of the city, will constitute the largest plant in the United States.

The Bullard Machine Tool Company, working at capacity making special presses for the Remington Arms-Union Metallic Company and lathes for turning up cartridges for other ammunition concerns, finds itself in the unique position of being so busy that it cannot keep up to its usual production of boring mills. The big plant is working day and night, as is every metal factory in the city.—E. C. D.

NEW BRITAIN, CONN.

MAY 3, 1915.

During the past month business conditions in New Britain in the metal manufacturing lines have been picking up considerably, and several large orders for war materials received by local concerns have added to the change for the better.

Vice-president Howard C. Noble, of the North & Judd Manufacturing Company, stated to a correspondent that his company is to build a large addition to its plant. Asked the details, he said that one of the larger frame factory buildings is to be raised two stories, making it a four-story structure. In the rear of the present office building another large extension, in the form of a seven-story building, will in all probability be added. These new additions will greatly increase the floor space and will take care of the overflow business which cannot at present be accommodated. Some of the departments are working night and day. While the company has some large foreign war orders that have not yet been caught up with, Mr. Noble reports that there is a large volume of general business coming in. The vice-president declares that he looks for a big business boom for the next five years. During the hard times, he explains, the customers have been living in "from hand to mouth style," simply ordering what was necessary for immediate wants. As a result, their stock has been drained out and with the revival of business everybody is getting ready to stock up and orders are coming in in a most encouraging manner. The war business at North & Judd's consists of the manufacture of the soldiers' accoutrement, as it is called. This is a sort of harness for his equipment. Saddlery hardware is also made. It is reported, but not officially confirmed, that this concern is angling for a $500,000 war order from one of the belligerent nations.

The war has also proved a boon for the American Hardware Corporation, for the Corbin Screw Corporation branch has two large orders on its books, according to reliable information. One of these is for $52,000, and the other for $100,000, made by the Russian government with the Canadian Car & Foundry Company, which has given out orders on an $83,000,000 contract to various American manufacturers. President Charles Glover admits receiving the $52,000 order recently. The Corbin Company is manufacturing the brass pieces which go on to the shrapnel and howitzer shells. Business is reported to be picking up rapidly all through the American Hardware Corporation, regardless of war orders, it is said by those on the inside.

The war is also playing an important part in the business of the New Britain Machine Company, which, however, has a good sized list of other orders. The concern is working a night and day shift and a full complement of men is being employed.

One of New Britain's youngest but most rapidly growing and important concerns, the Waterbury Tool Company, occupying floor space rented in the big factory of the New Britain Machine Company, may soon be lost to this city, as the management of the concern has purchased a large strip of land in the city of Waterbury. The company was formerly located in Waterbury and a small part of it is still there. President Horace G. Hoadly, however, is quoted as saying that the purchase was simply to add to the concern's

holdings, but he had nothing to say about his intentions of moving the factory.—H. R. J.

PROVIDENCE, R. I.

MAY 3, 1915.

Throughout the state there is heard the hum of busy machinery at this time, the metal trade factories being the ones which are working the nearest to capacity. There is a good demand for competent help, and men are being called back to Providence from other centres of industry to take their old places at the machines, which have in some instances been idle for months. A considerable amount of war orders is being made up here, although this infusion of business does not create as much excitement or interest as it did several months ago. What the volume of this business is, or its exact character or definite announcement by particular or individual concerns is not positively obtainable, but the different plants are turning out machinery that can be used in making rifles, submarines, guns of various calibres and shrapnel. In addition there is some shrapnel being made here, and it is stated on good authority that parts of submarines are being made here and being shipped to Canada. Of course this has materially stimulated the manufacture of small tools, small parts and accessories of all kinds, so that the plants making these lines are correspondingly busy in practically all lines of metal.

About the only one of the metal working lines that has experienced little or no change is the manufacturing jewelry industry, and here there appears to be very little immediate hope for relief. There are a few of the plants among the more than 200 in this city that have a good business in special lines, but the majority of the concerns are ready to close their doors if it were not for the desire of holding the shop forces, in many cases built up through years of labor and selection, in readiness for any revival when it should come.

Boland patented blowers are growing in favor, according to the makers, H. J. Astle & Company, of this city. Recently a Boland ventilating fan was installed in the factory of H. C. Luther & Company, 227 Eddy street; a blower and sand blast system has been shipped to F. J. Ernewein, Buffalo, N. Y., and a blower has been shipped to the W. O. Hickok Manufacturing Company, Harrisburg, Pa.

Joseph Dash, sheet metal worker, has removed from 31 North street, Pawtucket, to 507 Eddy street, this city.

The American Emery Wheel Company's plant is being operated on a full-time schedule, and has been since the first of the month. Since the beginning of the year business has been gradually picking up until the present schedule has resulted. It is stated that the improvement is in the nature of a general revival rather than due to any special orders, and the outlook is very encouraging.—W. H. M.

BOSTON, MASS.

MAY 3, 1915.

Although it is the general impression in metal houses of this city and suburban manufacturing places that the business outlook is improving, the sentiment finds expression in general terms rather than in specific examples of actual betterment of conditions. Perhaps this is due to the fact that comparatively few Boston concerns in the business are in a position to derive direct benefit from the war orders that have helped metal workers in other manufacturing centers.

A serious blaze in South Boston on the afternoon of April 24 destroyed the building at L and First streets, occupied by several metal working concerns, endangered a large nearby tenement district and caused about $150,000 property loss. The firms burned out were: First floor, Boston Metal-Leather Company; second floor, Thomas W. Byrnes, wires and electric batteries, also Michael F. Cahill, owner of the factory building, ferrule and tool manufacturer; third floor, Allington & Curtis Company, sheet metal workers; fifth floor, Boston Art Metal Company. The fourth floor was unoccupied. There are upward of 200 employees in the different shops, but it was the time of the Saturday half-holiday, and there were no casualties.

There has been still further interest in building interior finish, efforts to maintain a fair amount of activity in structural work having been to a considerable degree successful in this section for some time past. General work, however, is hardly normal in its scope as yet, in spite of the hopeful tone that is adopted by manufacturers in discussing prospects for the balance of 1915.

The Newburyport Silver Company has established show rooms at 387 Washington street, in Room 601.—J. S. B.

BUFFALO, N. Y.

MAY 3, 1915.

A little more optimism prevails among local dealers. The fore part of April was very encouraging, as there was a gradual healthy growth. During the end of the month, however, there was a slight drop, but this, the dealers believe, will only last for a few days. On the whole, the local situation looks very encouraging as trade is brightening up. With prices of metals constantly on the upward scale, a number of local dealers are much pleased because they took advantage of the drop in copper two months ago by buying enormous quantities of the red metal. Collections continue to be slow. The banks are beginning to loosen up a bit, railroads are doing more buying, building operations are on the increase, and less men are out of work, all of which the local dealers consider as encouraging.

Foundry trade conditions are constantly on the increase. A number of the foundries have been increasing their force. Some of the foundries have never been so busy in their entire history, while others are less active. The less active ones are, however, very optimistic, as they expect a very material increase during the month of May.

Finished metal dealers are quite active. Orders are coming in briskly. Prices are strong. With an exception, here and there, every finished non-ferrous metal producer radiates a look of satisfaction.

Judging from the amount of fixture work coming in for replating, and which the local electroplaters and polishers consider a trade barometer, this end of the metal trade may be said to be on a firmer footing than for some time past.

The Mayer Carburetor Company have just completed a one-story frame 26 x 36-foot brass and bronze foundry, which is equipped with two furnaces. The carburetor casting work formerly done by the Model and Buffalo Brass Foundries, will now be done in their own plant.

The Buffalo Copper and Brass Rolling Mill is rolling an order calling for a great many thousand tons of brass. This firm is building a 30 x 36-foot addition to their pattern and repair shop, which is to cost $8,000. This is the second addition made to their plant during the past two months.

The Automatic Buffing Machine Company reports a sale of twenty-eight buffing machines in March, and over eighteen during the month of April.

A. F. Flanders Manufacturing Company, and the Washington Plating Works, report a gradual increase in business, also that collections are poor.

A. G. Fries Plating Company are unusually busy. They are now working their plant full capacity, nine hours a day instead of eight, the usual number.—G. N. G.

NIAGARA FALLS, N. Y.

MAY 3, 1915.

Local trade conditions are beginning to have a more healthy tone. While conditions are still abnormal, yet a decided improvement is noticeable in every one of the non-ferrous metallic and allied lines. Some lines show a greater activity than others. The foundries are unusually busy with a number of contract orders. And judging from the number of orders and contracts the local foundries will continue to be busy for some time to come. All the stamping mills are very busy with both foreign and domestic orders. Domestic orders are making a better showing than for some time past

The jewelry and silverware manufacturers' trade, although spotty, nevertheless is showing some slight signs of improvement, considering the depression through which we are passing. Some of the local men are more optimistic about the future than others.

Electroplating establishments are also showing signs of improvement. Local electroplaters are confident that summer will bring back a large portion of their usual summer trade. Local finishers, foundries and electroplaters supply manufacturers are running full capacity. Their trade is about an even toss-up between domestic and foreign trade.

Considerable enthusiasm is being displayed by the Niagara Falls mercantile and industrial captions over the "Made in Niagara Falls" industrial and commercial show which will be staged at the Cataract House, and which opened its doors on May 3rd. Among the exhibitors will be William A. Rogers, Ltd.; Titanium Alloy Manufacturing Company; The Spirella Company, Inc.; Norton Company, and the Carborundum Company.

A concern known as the Aviation Materials Company has been recently organized here to manufacture aeroplane parts. The company is said to have a superior process for the manufacture of magnesium. At present they are occupying the old Titanium Alloy Manufacturing Company's plants. George P. Seward, of 99 Cedar Street, New York City, is said to be interested in the concern.

John Lebherz, manager of the Frontier Brass Foundry, stated that they had added five additional men to their regular staff of foundrymen in order to keep pace with the orders, a number of which are contract orders.

W. M. Corse, of the Titanium Alloy Manufacturing Company, reported that business was improving. He also stated that they are making some unusually large aluminum bronze castings for the Boston and Maine Railroad and other large concerns. The Aluminum Company of America's two local works are both quite busy with orders received from their sales department.

A. H. Wright, in talking about the present jewelry manufacturing trade said, "business is spotty, slightly better and spasmodic."

The Oneida Community Company, silverware manufacturers, who recently moved their plant from Niagara Falls, N. Y., to Oneida, N. Y., are now contemplating the establishing of a finishing plant at Niagara Falls, Ontario, Canada, because of the increase in the tariff on finished silverware.

C. E. Leffel, of the Spirella Company, Inc., reports that their business is gradually increasing. The Norton Company and Carborundum Company are both working part of their plants on a night and day shift. The McCormick Manufacturing Company, Ltd., of Welland, Ontario, Canada, recently incorporated, is capitalized at $40,000, to carry on a brass and iron foundry, also the manufacture of chemicals. The incorporators are: Frank H. Rice, Melvin Misener, Anna Reid, all of Welland; Charles L. Cooper, of Brantford, and A. Glessman, of Conneautville, Ontario, Canada.—G. N. G.

DETROIT, MICH.

May 3, 1915.

Authorities who are regarded as being in a position to know, state that within the last two weeks war orders totalling $3,171,000 have been received here. A large part of this sum is to be expended for motor trucks and the balance for shells and other brass and aluminum equipment. It is said most of these are sub-contracts coming from the Canadian Car & Foundry Company, and are to be filled for the Russian government. One Detroit firm, dealing in copper and brass, it is reported, has received an order totalling $2,400,000, one motor parts concern an order for $650,000, and another for $21,000. At the present time fifteen concerns in Detroit are manufacturing war material.

Owing to these orders many factories here are now operating to capacity and skilled workmen are in demand. While all the pleasure car plants are operating full time, the truck plants are rushed with work in an effort to fill orders for export.

Detroit is found to be one of the best places in the country in which to manufacture this war material. It has the brass, copper and aluminum plants, it has the skilled workmen, and it also is right on the Canadian border where completed products can be shipped into British territory in an hour's time, and with all danger of transportation delays eliminated. Exports from this port for the past three months total $11,818,966. For March the total was $8,295,542, and for the same period one year ago the total was $5,295,542. This heavy increase, especially in a so-called dull period, is largely represented in war material, consisting of brass, copper and motor trucks.

The advance in price of copper, brass and aluminum continues and no one can forecast how high it will go before the present condition subsides. With the conviction that the market price for copper can be maintained at 16 cents per pound or more, a resumption of construction work has been ordered in the mines at and near Calumet, Mich. This work was stopped last fall, a few months after the war started, but conditions have changed and these mines are taking on large crews. This resumption of business will be of great benefit to Detroit manufacturers, especially as copper is much in demand here at present. Navigation on the lakes is now open and thus copper can be shipped here much cheaper and more advantageously than to any other point in the country.—F. J. H.

Reviewing the business conditions of the metal industries in Detroit and vicinity for the month of April I am able to state conditions at the present time are at their high water mark.

The railroads are at last coming into the market for supplies and as Detroit is the manufacturing center of brass lubricators, injectors and oil cups the different manufacturers of these specialties have booked some nice orders this month. The management of the Pennsylvania Railroad have placed one of the large orders with different concerns for brass goods in Detroit this month, and concerning these orders said they were preparing for the future and intimated that their stock of supplies were very low and they were expecting an unprecedented era of prosperity.

The manufacturers of plumbing and steam brass goods are now running full time and the outlook is a decidedly hopeful one, the best in a long time.

There has been incorporated at Lansing and papers of incorporation filed with the secretary of state this week a new brass manufacturing company, to be known as the Keystone Brass Manufacturing Company, of Detroit, with a capital of $20,000. The stockholders are Michael H. Green, George G. Leonard and Clifton P. Weil. The sudden and unprecedented raise in metals this month has led to heavy purchasing of copper and zinc by the different manufacturers of brass goods, as a report is general that Great Britain is now in control of the world's copper supply outside of Germany. While making the blockade against Germany's commerce effective, negotiations were made in London to control the Amalgamated Copper supply and after these were consummated other interests were dealt with one by one.

Some of the Canadian brass manufacturers have equipped their plants with new machine tools to handle this line of goods.—P. W. B.

COLUMBUS, OHIO

May 3, 1915.

A better feeling has developed in the metal market in Columbus and central Ohio. This is apparent all along the line and all who are interested are more optimistic. The volume of business is larger and prices are generally higher. The bad effects of the war are slowly passing away and future prospects are brighter. Tin scraps is probably the only metal which has not joined in the advance.

Copper is firmer all along the line and prices to the trade are 16½ to 17 cents. Brass is also in better shape with quotations ranging as follows: Red scraps, 13½ to 14 cents; yellow scraps, 9½ to 10 cents. Aluminum is holding up well at about 17 to 18 cents per pound. Zinc is selling at 15¼ cents. Babbitt metal is in better demand, with prices unchanged from a month ago.

The Henry Laudenslager Foundry Company on West Mound street, which has been exclusively iron, has branched off into the brass foundry business. Working a full shift of six days a week and operating on an average of three nights a week, business prospects for the Atlas Brass Foundry Company, of South Front street, Columbus, Ohio, are by no means discouraging. The concern is engaged in several large contracts at present, among them being material which enters construction of a Detroit-made automobile. I. H. Pleuk-

harp, a member of the firm, returned recently from Detroit and Chicago in the interests of his company.

The Solar Metal Products Company, of Chicago, will move its equipment to Columbus, Ohio, and will start soon the erection of a plant to cost $50,000, it was announced recently by John A. Kelly, manager of the industrial bureau of the Chamber of Commerce. The company has purchased six acres of land at Third avenue and Cleveland avenue and will employ 150 men.

The Victor Specialty Company, of Canton, Ohio, is planning the erection of a new building to take up the manufacture of metal toys, it was announced. The capital stock of the company was increased from $50,000 to $100,000 for the new venture.

The Elyria Enameled Products Company, of Elyria, Ohio, has been incorporated with a capital stock of $150,000 to deal in enameled products. The incorporators are Charles E. Wilson, John Murbach, C. E. Blanchard, C. M. Berman and Theodore T. Robinson. It is planned for the company on perfecting its organization to take over the plant of the Enamel Pipe & Engineering Company, who have been operating under a receivership.

The Enamel Products Company, of Cleveland, Ohio, has filed papers with the secretary of state increasing its capital stock from $36,000 to $75,000.—J. W. L.

CINCINNATI, OHIO

MAY 3, 1915.

If anything, the activity among certain specialized branches of the metal industry in this section has increased rather than diminished during the past month, being for the most part due, as heretofore reported, to the extraordinary demand for war materials and the machinery with which to make them. Lathes and similar machine tools which are indispensible in the manufacture of shells and other munitions of war are in very active demand, while many of the local plants which normally make nothing but these machines are busily engaged in turning out shell-casings of brass, working in some cases twenty-four hours a day. Prices on these orders are invariably high, making the margin of profit very attractive. Moreover, the improvement in the general industrial situation has resulted in a good many orders from the ordinary sources, from domestic manufacturers, leaving little to be desired, as far as the machine-tool trade and the foundries serving it are concerned. Indications are that this year will prove one of the most prosperous which these branches of business have ever experienced. The copper trade is also doing fairly well, although hampered somewhat by the high price of the material, and the slackness in some of the lines, notably the distillery industry, in which copper appliances are largely used. Most of the distilleries in this section have already closed down, after a very short season's run, and the feeling regarding the future of the business is such that not much business for the coppersmiths is likely to result.

One of the largest war orders received in this section was that landed not long ago by the Dayton (O.) Computing Machine Company, for $15,000,000 worth of material, supposed to be for Russia. The goods to be manufactured under this order are timing devices for shells, to regulate their explosion, and the company is making large additions to its plant in order to get the material out rapidly. The Buckeye Iron & Brass Company, also of Dayton, recently received a large order of another nature, being for machinery and parts for what will be the largest cocoanut oil mill in the world, to be erected in the Philippine Islands. A number of Dayton concerns are busy on war orders, giving employment to numerous workmen who have not been busy for some time.

After a conference in the office of Charles Atherton, of Cincinnati, Central Secretary of the Metal Polishers' International Union, the Safety Committee of the State Industrial Commission decided to recommend to the Ohio Industrial Commission that all metal polishing and other dust-producing machines be equipped with exhaust fans to carry away dust during operation. According to Mr. Atherton, about 70 per cent. of the deaths among metal polishers on some classes of work are due to tuberculosis resulting from the employment, and this danger will be eliminated by the proper installation of exhaust fans. It is anticipated that employers will not be at all opposed to the plan, inasmuch as it has been held by the Ohio courts that disability due to occupational diseases is ground for compensation under the workmen's compensation act, and the reduction of the danger from this source will automatically cut down the premiums paid by the industry for protection under the act.—K. C. C.

PHILADELPHIA, PA.

MAY 3, 1915.

The long expected revival of business in the metal industry of Philadelphia and the vicinity seems to have made its appearance. Several of the largest manufacturers declare that they have recently been the recipients of large orders and that their factories have been kept very busy for several weeks past. This welcomed boom in the field of metal work has certainly arrived at a most opportune time, as the past conditions have been such as to warrant a decidedly pessimistic feeling among the trade here. Manufacturers of jewelry report an increased volume of business for the past several weeks and as jewelry is a luxury, this fact tends to prove that better times have really made their appearance. It has been reported that several large local concerns have landed large war orders, and, from the amount of activity displayed, this must be the case.

It has been announced that Franklin G. Hirst, John H. Dallas and George Wunster have recently made application to the governor of the State of Pennsylvania for the charter of an intended corporation to be called the Franklin Brass Manufacturing Company. The object of the new company is to manufacture and sell all sorts of brass specialties used in the plumbing and heating business.

One of the busiest plants in the city of Allentown, Pa., is the Brey & Krause Manufacturing Company, who have been in operation at Front and Chew streets for a period of seven years. The company started in small quarters but the grade of work turned out warranted many large orders, necessitating the continual addition of more space. They turn out all sorts of nickel plating, brass and bronze moulding and do a large business in the manufacturing of hinges, etc., for furniture establishments. One of the largest furniture houses in the country, located in Grand Rapids, Mich., buys a large percentage of its fixtures from this concern.

Two men were recently badly burned about the face and hands at the factory of Joseph Kopperman, manufacturer of brass ware, No. 307 Florist street. After first aid treatment by a nearby physician they were sent to the Hahnemann Hospital. The men were testing some tubing by filling it with rosin and then heating it. The tube burst, throwing the hot rosin over the men.

W. L. Wright, former vice-president of the Taylor-Wharton Iron and Steel Company, has recently been elected a director and vice-president of the Watch Case Company, of Philadelphia.

It has recently been learned that the Crescent Brass Manufacturing Company, of Reading, Pa., is contemplating the erection of an entirely new factory to be used for the purpose of manufacturing aluminum castings.—P. N. S.

LOUISVILLE, KY.

MAY 3, 1915.

Louisville coppersmiths report a slight improvement in conditions during April. Several of the foundries received nice orders for special castings of one kind or another, and the general dullness which was in evidence during March has blown over to some extent. The Rapid advances in copper are looked upon as one of the necessary evils resulting from the war, which has played havoc with a number of industries and manifested itself in the copper industry to some extent.

Sheet copper is hovering around twenty-three cents just now, and from present indications may go even higher. The local coppersmiths are not using any large quantities of copper just now, and are therefore not especially worried over the aspect of the market. The trade is not looking forward to any big decrease in prices until the war is over or some change is effected in the export demand.

W. P. Davis, of Louisville, the leading dealer in sheet cop-

per, pigs, rods, etc., recently completed a trip through the Carolinas and is now in Texas. He reports an excellent business in the South.

J. W. Rademaker, head of the Independent Brass Works, was recently awarded a handsome government contract for packing rings to be used on battleships. The contract was the largest of its kind that the company has ever received and calls for about 4,500 pounds of finished castings. These castings are from twenty-six to thirty-six inches in diameter, and weigh in the neighborhood of twenty pounds each. They are about two inches wide and one-half to three-quarters of an inch thick. The concern has been working on the contract for about three weeks and has about ten days' more work to do on it. Another large contract was recently received for furnishing brass handles to the Louisville Railway Company for use on the seats in interurban cars.

The Kentucky Wagon Manufacturing Company has now entered the market as one of the large users of finished brass goods. The company recently formed an agreement with the Hercules Motor Car Company to manufacture the latter company's automobiles. Most of the parts are made in factories away from Louisville and brought here for assembling. The company will turn out about twenty cars a day for the time being.

The Ahrens & Ott plant, of the Standard Sanitary Manufacturing Company, of Louisville, manufacturers of brass goods and enamel ware for plumbers, was the first of a number of Louisville manufacturers to apply for floor space for permanent exhibits of Louisville-made goods in the Arcadia building at Fourth and Broadway. A committee from the Commercial Club recently completed arrangements whereby the entire second floor of the building has been leased for a permanent exhibit of Louisville-made goods. An effort will be made to show Louisville people the products of Louisville factories. Over 21,000 square feet of floor space will be utilized in displaying local goods.

Alex. Gregoire, of Ahlers & Gregoire, said that while trade had been slack a slight improvement was being experienced of late. No one line is coming in for any great amount of business, but a little of everything in the copper line is being handled. The confectioners are taking a larger volume of copper kettles than for some time past. The canning plants in many cases have announced that they will not operate this season and very little canning work is expected.—G. D. C.

TRENTON, N. J.

MAY 3, 1915.

That there is a distinct and marked improvement in the metal industries in this city is the general opinion of those engaged in these lines. The business in the metal lines is assuming normal proportions and it is the belief that business will continue to improve. Mechanics are putting in more time and are making up time lost during the early winter months. During the past winter many expert mechanics in the metal lines found the times so dull that they were compelled to apply at the City Relief Station for assistance, while others sought other employment until conditions improved.

William G. Wherry, general manager of the Skillman Hardware Manufacturing Company, says he finds times in his line very prosperous. "Despite the tariff and European war our business has continued to improve," he said. "We are receiving many orders from the West and are now working on a large one for a concern in Salt Lake City. Our southern trade is also beginning to pick up." Mr. Wherry left on April 25 for an extended business trip through the West, including Pittsburgh and St. Louis. Edward V. D. Skillman, president of the concern, who recently died, always looked after the big business on the road, and now this has been taken up by Manager Wherry. Since Mr. Skillman's death there has been no change in the management. Mr. Wherry is now acting as both president and general manager.

The Jordan L. Mott Company, of this city, is only running its brass department three days a week.

Philip Billingham, president of the Billingham Brass and Machine Foundry, believes the future is bright for the metal industry. In conversation with a representative of THE METAL INDUSTRY he said: "We are very busy at the present time with government orders and the general business is beginning to show improvement. I certainly believe the future is very promising and am looking for good times ahead."

The McFarland Foundry and Machine Company is turning out a number of special brass and bronze castings and wire drawing dies. The management believes these departments will continue to improve.

There has been a slight improvement in the copper department of the John A. Roebling's Sons Company during the past month. The fine metal wire department, where material is made for many of the jewelry concerns in the New England states, has been removed from here to Roebling, N. J. This department is always closely watched because of the valuable diamonds used in drawing the fine metal. There has been no change in conditions at the Trenton Brass & Machine plant, no large orders having been received during the past month. The Trenton Smelting and Refining Company is experiencing busy times at present and both local plants are working to full capacity. The Ingersoll Watch Company has plenty of orders on hand and Manager Eberhard believes he is going to have a busy summer. A new addition was recently added to the plant. The Mercer Automobile Company is busy in the brass department preparing for a busy spring trade—C. A. L.

NEWARK, N. J.

MAY 3, 1915.

Within the past few weeks metal manufacturers of Newark have seen a little improvement in business conditions. Business with the majority is still very slow, but more inquiries are coming in, and that is encouraging as far as it goes, for it shows that others are beginning to plan for greater things. While some have not seen the turn yet, many think they see a much more optimistic spirit in the trade, and some have good grounds for this feeling because of increased orders that they are beginning to receive. A few are doing really well and have nothing to complain of at all as far as volume of business is concerned. One of the latter concerns is the J. L. Sommer Manufacturing Company, manufacturers of wire and metal novelties at 93-107 Chestnut street. This company is working four and five nights a week, and is unable to get its orders out on time even then. Its experience, however, is exceptional, and does not register the condition of the trade in Newark.

The Merigold Electro-Plating Company, also of 93-107 Chestnut street, is encouraged by the fact that with a little more business coming in there are more numerous inquiries from reliable concerns.

Frederick W. Bartlett, of Caldwell, has been granted a patent for a silvering apparatus.

While business has not materially increased with the Art Casting Company, 104 Verona avenue, there has been a little gain within the past two or three weeks and more inquiries are being made than for several months before.

The White Art Metal Company has opened a factory at 17 Nevada street. This company makes a specialty of all sorts of white metal novelties, toys forming an important branch of the business. The company does a big business with department stores and toy jobbers.

John S. Williams, engraver and engine turner, has moved from 91 Oliver street to the rear of 109 Oliver street. The C. A. C. Silver Company, silver platers and manufacturers of fountain pens, have also moved from 91 Oliver street to the rear of 109 Oliver street.

Smith, Brannan & Strein, electro-platers and polishers, report a good demand for coloring by the electro-croma method, depositing the color on spelter or other base instead of by the lacquer method. They also report quite a demand for the metalizing of "Baby's first shoes."

Jack Katz has returned from a trip in the interest of the Elite Novelty Manufacturing Company, which included visits to the trade in Chicago and other cities of the Middle West. He secured considerable business.

John C. Blevney, of this city, has been granted a patent for a grinding and polishing machine. (See Patent Department this issue of THE METAL INDUSTRY.)

The Art Metal Works, Mulberry street, reports that its export business is increasing. The company is now making many metal toys.—R. B. M.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Hendey Machine Company, Torrington, Conn., has plans completed for a core room building, 60 x 90 feet, one story high, and also for an additional foundry building.

Maher & Flockhart, Newark, N. J., have had plans prepared for the rebuilding of their core shop in connection with their foundry. The building is estimated to cost $7,000. No new equipment will be needed.

The Remington Arms Company, Ilion, N. Y., has awarded the contract for the construction of a four-story steel, brick and concrete factory. The cost of the work is estimated to be $600,000.

The Dayton Polishing Company, Dayton, Ohio, recently incorporated with $10,000 capital stock, will establish a plant on Bacon street, that city, for the manufacture of wood and metal polishes.

A brass foundry has been started at St. John, N. B., by Messrs. Eagles, Hogan and Sterling and it will operate under the name of the Saint John Brass Works, brass founders and finishers, with offices at 39 Canterbury street, St. John N. B.

A new foundry has been started by T. C. Driscoll, which will be known as the Dunkirk Foundry Company and will be located at Dunkirk, N. Y. The company will manufacture brass, bronze and aluminum and it is stated are capable of handling from 600 to 900 pounds of metal a day.

Work has begun on the additions to the plant at Landers, Frary & Clark, New Britain, which were to have been erected last fall. A tinning building will be 30 x 140 ft. and forge shop 40 x 125 ft., both one story.

The Dominion Sheet Metal Company, Ltd., is the name of a new concern which has just recently been formed at Hamilton, Canada, to manufacture galvanized sheets and products. It is reported by A. T. Enlow, of Oshawa, Ont., Canada, to be capitalized for $300,000, and will begin operation about the first of July.

The United Smelting and Aluminum Company, New Haven, Conn., announce that they have completed additions and improvements to their foundry which will enable them to handle larger units and consequently make substantial savings on the cost of production, the benefit of which will be given to their customers.

The Winchester Repeating Arms Company, New Haven, Conn., has secured a permit to build a factory on Winchester avenue, to cost $175,000. The departments operated by this company for the manufacture of its products are as follows: Casting shop, rolling mill, tool room, stamping, soldering and polishing.

Walter Edgar, 140 North Redfield street, West Philadelphia, Pa., announces that he is representing the Buffalo Copper and Brass Rolling Mill, manufacturers of sheet and rolled copper, brass rod, sheet and wire, copper bottoms, anodes, etc., and the Standard Brass and Copper Tube Company, manufacturers of seamless brass and copper tubes.

Plans are being prepared for a three-story addition to the plant of the H. H. Franklin Manufacturing Company, manufacturers of die-castings, Syracuse, N. Y. The plant will be 100 x 53 feet and will cost about $40,000, which will also include expenditures for new equipment. This addition is the outcome of the steady demand for die cast parts, the Franklin company having outgrown its present quarters.

The Apollo Metal Works, Peru, Ill., report that they are manufacturing plated sheet metals such as nickel-zinc, copper-zinc, nickel-tin, copper-tin, oxidized-tin, etc., stamped novelties and specialties, both from these plated sheets and from plain materials. This company will erect a factory and remove its plant to LaSalle, Ill., as its present quarters are inadequate. It is having special equipment of its own design manufactured.

The Lockport Chemical Works, manufacturing chemists and electro-chemical engineers, Lockport, Ill., announce that they are specializing in cleaners for electric and hot kettle cleaning operations and are in a position to handle all grease removing problems. They state that they make copper and zinc cyanides and numerous other specialties for platers; also galvanizing salts and a line of buffs, compositions, electrical apparatus, etc., for platers. Fred C. Ohlmacher is manager of this company.

The Springfield Brass Company, Springfield, Vt., which is planning to build an extensive addition to its foundry, has secured the services of Hugh McPhee as manager of their new shop. Mr. McPhee is one of the well-known foundrymen in the country and has had long experience in some of the largest factories, including the Buick automobile plant at Detroit, Mich., the Pratt & Cady plant at Hartford, Conn., and the big valve factory of Crane Brothers at Bridgeport, Conn. Other officers of the company are Paul Luther, superintendent; and Fred B. Gill, secretary and treasurer.

MEETINGS

The annual meeting of the stockholders of the Joseph Dixon Crucible Company was held at the company's office in Jersey City, N. J., on April 19, 1915. There were present a large attendance of stockholders, who expressed their satisfaction with the present management and re-elected the former Board of Directors for the ensuing year. The vote recorded was the largest ever represented at an annual election—19,519 shares out of a possible 20,000. The following-named gentlemen are the directors elected:

George T. Smith, Robert E. Jennings, George E. Long, E. L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey. The officers elected by the Board of Directors are:

President, George T. Smith; vice-president, George E. Long; treasurer, J. H. Schermerhorn; secretary, Harry Dailey; and assistant secretary and assistant treasurer, Albert Norris.

WAR ORDERS

The daily press reports that the Russian government has placed with the Canadian Car and Foundry Company, Montreal, Canada, an order for shrapnel and howitzer shells which amounts to $83,000,000. The Canadian company has sublet contracts for $21,724,400 to American manufacturers and negotiations are far advanced for additional sub-contracts for the manufacture of $30,000,000 of additional shells in this country. The following is a list of the sublet contracts, with the names of concerns and the amount of each as it is apportioned, for materials which are connected with the metal industry: United Lead Company, New York, $280,000; American Tube and Stamping Company, Bridgeport, Conn., $67,500; Michigan Brass and Copper Company, Detroit, Mich., $2,400,000; American Brass Company, Kenosha, Wis., $375,000; Auto Parts Manufacturing Company, Detroit, Mich., $650,000; Yale & Towne Manufacturing Company, Stamford, Conn., $71,000; Corbin Screw Corporation, New Britain, Conn., $152,000; Dayton Manufacturing Company, Dayton, Ohio, $320,000; Worcester Manufacturing Company, Worcester, Mass., $480,000; Bridgeport White Metals Casting Company, Bridgeport, Conn., $360,000, and Blake & Johnson Company, Waterbury, Conn., $22,000.

QUARTERLY DIVIDEND

The directors of the Aluminum Products Company, Lemont, Ill., at their quarterly meeting held April 5, 1915, declared a cash dividend at the rate of ten per cent. The company has never failed to pay a dividend since starting in

business five years ago. The company reports a general revival of business and their purchasing contracts for raw material are now made on a basis of three-quarter million dollars' business for the current year.

DISSOLUTION OF FIRM

Notice has been received of the dissolution of the International Smokeless Powder & Chemical Company, following the sale of all of its assets to the E. I. duPont de Nemours Powder Company. The duPont company has held a controlling interest of the International stock for about ten years past, during which time it has directed the operations of the International's factory and selling force under the same policies as have governed the other branches of the duPont company's business.

Besides the manufacture of smokeless powder, the International does an extensive chemical business, and in this branch has for years made a specialty of amyl acetate, refined fusel oil and soluble cotton for lacquer manufacturers, and about two years ago extended its activities in this line to include the preparation of finished lacquers for direct sale to consumers. This chemical business will be continued under the name of DuPont Chemical Works, and as no changes are to be made in the manufacturing and selling organizations that have had charge of the business to date, the only difference will be in the corporate name.

FIRES

On April 3, 1915, fire, caused by the bursting of a fuel pipe in the melting room of the plant of the Aluminum Castings Company, manufacturers of aluminum castings, 1095 Niagara street, Buffalo, N. Y., did about $200 damage.

The plant of the Canadian Wolverine Company, manufacturers of plumbers' supplies, Chatham, Ont., Canada, was recently destroyed by fire. The departments of the plant included a brass and bronze foundry, brass machine shop, spinning and stamping department and plating, polishing and japanning department.

BUSINESS TROUBLES

The Finished Parts Manufacturing Company, Newark, N. J., went into the hands of a receiver on April 23. Ernest C. Lum, of Chatham, Essex County, N. J., was appointed by Edwin R. Walker, Chancellor, as receiver.

Under date of April 12, A. J. Willard, treasurer of the Taunton Crucible Company, Taunton, Mass., reports that the company was winding up its affairs and that it was expected would be closed up before the first of May.

INCREASE IN CAPITAL STOCK

The Northern Brass Manufacturing Company, Waukegan, Ill., has increased its capital stock from $55,000 to $75,000 instead of from $25,000 to $75,000, as reported. The company operates a brass machine shop, stamping department and a plating and polishing department.

The Trio Manufacturing Company, Detroit, Mich., manufacturers of automobile parts and metal stampings, has increased its capital stock from $250,000 to $300,000, to enable it to handle its rapidly increasing business. A brass, bronze and aluminum foundry, grinding room, stamping, tinning, soldering and polishing departments are among the branches used in the manufacture of their products.

The National Brass Company, Grand Rapids, Mich., has increased its capital stock from $90,000 common to $150,000 common and $50,000 preferred, and has taken over the Hardware Supply Company and will immediately start on an addition of 65 x 100 feet which will be completed inside of ninety days for the accommodation of both plants. The officers of the National Brass Company are: Otto G. Kutsche, president; L. A. Dexter, vice-president and general manager, and Adrian de Windt, secretary and treasurer.

REMOVALS

The New York office, H. K. Spaulding, manager, of the Aluminum Company of America, Pittsburgh, Pa., has been moved from 99 John street to 120 Broadway, New York.

The Taunton-New Bedford Copper Company, New Bedford, Mass., have removed their New York store from 42 Water Street, to 35 Howard Street, a situation better adapted to their present needs and more convenient for their customers. This mill rolls copper and yellow metal, naval brass and bronze, and manganese bronze in plates, sheets, bolts, bars and rods. They also manufacture nails, tacks, etc.

The Munning-Loeb Company, of Matawan, N. J., manufacturers of electro-plating, buffing and polishing machinery and supplies, announce the removal of their New York office from 50 Church street to the Brion Building, Canal and Sullivan streets. They also announce that after May 1 Peter A. Frasee & Company, Inc., 317 to 321 Canal street, New York City, will carry a complete stock of Munning-Loeb plating and polishing equipments and supplies, and will act as the Greater New York distributors for the Munning-Loeb Company.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To do a spinning and stamping business.—Michigan Brass & Glass Company, Lansing, Mich. Capital, $10,000. R. C. Lynn, president.

To melt and refine scrap material into pigs and ingots.—The Metal Supply Company; capital, $5,000. Incorporators: David H. Miller, Abner Miller, and A. F. M. Narlian.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Oil Filters.—The Richardson-Phenix Company, lubrication engineers and manufacturers, Milwaukee, Wis., furnish a great amount of valuable information in their bulletin No. 10, issued in March, relating to the Peterson power plant oil filter, as well as their special steam turbine oiling and filtering systems. Copies of the bulletin will be sent upon request.

Cleaning and Polishing Machines.—The Roby Cleaning & Polishing Machine Corporation, Staunton, Va., have issued a booklet giving complete description of their window cleaning and polishing machine. This machine is operated by an electric motor, and it is claimed it dispenses with bowls, buckets, basins, tubs, wash rags, and sponges, and will prove indispensable in cleaning railroad cars, windows, floors, furniture and metal work.

Insulating.—The Armstrong Cork and Insulation Company, Pittsburgh, Pa., have issued a small but interesting folder giving a description of their Nonpareil high pressure covering, which is said to be material par-excellence for the insulation of super-heated steam surfaces. Compared with other high pressure coverings Nonpareil is claimed to be not only a better non-conductor of heat, but that it withstands higher pressure without calcining or disintegrating.

METAL MARKET REVIEW

NEW YORK, May 3, 1915.

COPPER.

Prices of copper have been advanced about four cents per pound during the month of April, from 14¾ the producers' price at the end of March to 18¾ at the end of April.

The price has been run up on reported enormous export orders and a big demand by home consumers, supposedly, for war material. The normal home demand for copper is not especially good, the wire people are only fairly busy and the railroad equipment firms are not, by any means, rushed with orders. Sixty to sixty-five per cent. of capacity would be a fair estimate for the home business, outside of the extra rush with the brass mills for ammunition cases, etc. That puts it up to the brass mills to run at about 135 per cent. capacity to bring the home consumption up to a normal basis. It is quite a question whether the brass mills are equipped to run at 135 per cent. Running night and day means running at absolutely full capacity, and that's about all they can do. The extra 35 per cent. seems to be a physical impossibility, but that is what the brass mills have to be doing to bring the home consumption of copper up to normal proportions. What is the normal home consumption of copper? As a basis let us take last year; the average monthly consumption for the year 1914 was about 55 million pounds.

The exports so far this year average 20,706 tons per month; April will be about 18,000 tons. According to the reports we get about the enormous export orders, the exports cannot possibly be less than 1,000 tons a day, or say a total for the month of 70 million pounds. The custom house returns—a cold-blooded disinterested machine—the exports of copper for the month of April will just be about 18,000 tons, or 38 million pounds. This does not fit in very well with the enormous export orders reported, but then we are told that will be all right—all steamers are delayed and other freight is engaged at higher rates, etc.; the exports are bound to show, eventually, one "must have faith and everything will come out as we say." That is what we are told. Perhaps it would not be out of place to ask what is "faith" that we must have. The only definition of faith that comes to mind is "believing in something that one knows is not true," and that is just exactly where we get stuck and we do try so hard to be truthful and good and all that. Perhaps our readers can straighten out the stories we hear and the facts as they later appear better than we can—it is quite a problem for us to make them "match up."

There is no quesion about the advance in price. The price around the first of April was 16 cents for Electrolytic and at the end of April the price was around 19 cents—3 cents per pound in one month is pretty rapid work. The high-grade Lake brands have sold at all sorts of fancy prices. For certain work C & H brand has been specified in the contracts and as high as 24 cents has been paid and possibly might be higher. The Calumet & Hecla people always seem to be afraid to let their price be known; they prefer to stick their victims without any one knowing it. The ordinary brands of Lake copper have advanced to about 19 cents delivered New York basis. Casting copper has been the slowest to catch on to this manipulated war boom copper market and prices today are about 1 cent per pound below the price of Electrolytic, while ordinarily they range about ¼ cent below. Electrolytic today, 19; Lake, 19, with Casting, 17¾ to 18.

TIN.

The tin market is in an awful muddle. Committees have been to Washington from the Tin Committee on the Metal Exchange to try and get the British Government to loosen up on the restrictions placed on the metal in this country. As the market is today there is some free tin on the market and some restricted tin. Unrestricted is selling at about 42 cents and restricted about 40 cents, but it is an abnormal market and April deliveries have been held up because a dealer is not in position to furnish a consumer's guarantee. Spot tin is quoted at around 42 cents for 5-ton lots and futures 3 to 5 cents cheaper.

LEAD.

The lead market has remained very steady through all the turmoil of the other metals. The trust price has been held at $4.20 New York basis, and that is really all there is to say about the market.

SPELTER.

The expected has happened in spelter. We alluded last month to the fake quotations on spelter on the Metal Exchange when the price was broken from around 11 cents to about 9 cents, and now the screws have been put on again and spelter is up to 14 cents for spot lots. About 13½ for May and possibly 12½ for June. That's about where the market is today. Sheet zinc has been advanced to 16.00 at the mill.

ALUMINUM.

Market very dull and quiet; prices about the same as a month ago—98-90 per cent. ingots, 19 to 19¼.

ANTIMONY.

This metal is active again and prices have been rapidly advanced. The demand for war munitions is the direct cause of the advance and the end is not yet in sight. Cookson's is quoted nominal 35 cents, Hallett's very scarce and not quotable at all. Other grades around 30 cents and Chinese and Japanese, the only metal now available, is quoted at 28 to 29 cents and may be higher.

SILVER.

The silver market has ruled around 50 cents in New York and 23⅞d. in London. The fluctuations have not been in any way extreme.

PLATINUM.

Prices have been gradually sagging on account of poor demand; soft is more or less nominal at $40 per ounce, with 10 per cent. hard at $42.

QUICKSILVER.

The price has held fairly steady during the month; for a time there was a little shortness of supply, but lately the market has been normal at $65 per flask for wholesale lots and from $70 to $75 for small lots.

SHEET METALS.

The prices of semi-manufactured copper have been advanced rapidly with the advance in the ingot metal. Sheet copper is up to 24 cents, wire 20 cents and high sheet brass 20.50.

OLD METALS.

The market has been very active and a good business has been done in all copper bearing materials. Old copper wire has been especially active.—J. J. A.

APRIL MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	19	16.75	17.50
Electrolytic	18⅞	15.85	17.15
Casting	18	15.10	16.50
TIN	57	39.55	48.00
LEAD	4.22½	4.20	4.15
SPELTER	14.50	9.65	11.55
ANTIMONY (Hallett's)	34	28	29.50
SILVER	50½	49.35	50.26

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

1913—Average for year, 15.83. 1914—Average for year, 13.91. 1915—January, 14⅛. February, 15.25. March, 15.75. April, 18.50.

Brass Mill Spelter. 1915—January, 6.55; February, 11.85; March, 12.15. April, 13.85.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, May 3, 1915

NEW METALS.

	Price per lb. Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Lake, carload lots, nominal	19.00
Electrolytic, carload lots	18.85
Castings, carload lots	17.75
TIN—Duty Free.	
Straits of Malacca, carload lots	39.55
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	4.20
SPELTER—Duty 15%.	
Western, carload lots, nominal	14.00
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	21.00
Tons lots, f. o. b. factory	19.25
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	38.00
Hallett's cask lots, nominal	35.00
Hungarian grade	32.00 to 34.00
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	nominal
BISMUTH—Duty free	2.65
CADMIUM—Duty free	2.10
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty 10%, per flask	75.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	38.00
SILVER—Government assay bars—Duty free	50½c.

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	27 to 30
Silicon Copper, 20% ..... " "	31 to 34
Silicon Copper, 30% guaranteed. " "	33 to 38
Phosphor Copper, guaranteed 15% " "	27 to 30
Phosphor Copper, guaranteed 10% " "	25 to 28
Manganese Copper, 30% ..... " "	25 to 28
Phosphor Tin, guaranteed 5% ... " "	60 to 63
Phosphor, Tin, no guarantee .... " "	46 to 49
Brass Ingot, Yellow ..... " "	15½ to 16½
Brass Ingot, Red ..... " "	12 to 13½
Bronze Ingot ..... " "	17 to 18
Manganese Bronze Ingots ..... " "	21½ to 23
Phosphor Bronze ..... " "	18 to 19½
Casting Aluminum Alloys ..... " "	16 to 18

PHOSPHORUS—Duty free.
According to quantity ..... 30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
15.50 to 16.00	Heavy Cut Copper	17.00 to 17.25
15.00 to 15.50	Copper Wire	16.75 to 17.00
13.00 to 13.50	Light Copper	15.00 to 15.25
12.50 to 13.00	Heavy Mach. Comp.	13.50 to 14.00
10.00 to 10.50	Heavy Brass	12.00 to 12.50
8.00 to 8.50	Light Brass	9.50 to 10.00
9.00 to 9.50	No. 1 Yellow Brass Turnings	11.00 to 11.50
10.00 to 10.50	No. 1 Comp. Turnings	11.00 to 11.50
3.30 to ——	Heavy Lead	—— to 3.50
5.50 to ——	Zinc Scrap	—— to 6.00
5.50 to 6.50	Scrap Aluminum Turnings	6.00 to 7.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	12.00 to 13.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	13.00 to 14.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 24 Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
	SIZE OF SHEETS.	Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill ... 16.00 basis, less 8%	
Casks, jobbers' prices	16½
Open casks, jobbers' prices	17

Metal Prices, May 3, 1915

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect April 28, 1915, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.20½	$0.21⅝	$0.22⅝
Wire	.20¼	.21⅝	.22⅝
Rod	.20¼	.22⅜	.23⅝
Brazed tubing	.24⅛	—	.26⅞
Open seam tubing	.24⅛	—	.26⅞
Angles and channels, plain	.24⅛	—	.26⅞

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	1c.	per lb. net advance
" —Best spring, drawing and spinning brass	2c.	" " "
Wire—Extra spring and brazing wire	1c.	" " " "
" —Best spring and brazing wire	1½c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.21¾	$0.22⅞	$0.23⅞
Wire	.21½	.22⅞	.23⅞
Rod	.21½	.23⅜	.24⅞
Brazed tubing	.25⅜	—	.28⅛
Open seam tubing	.25⅜	—	.28⅛
Angles and channels, plain	.25⅜	—	.28⅛

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	1c.	per lb. net advance
" —Best spring, drawing and spinning brass	2c.	" " "
Wire—Extra spring and brazing wire	1c.	" " " "
" —Best spring and brazing wire	1½c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

20c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	23c.	per lb. base
100 lbs. to 300 lbs. in one order	23½c.	" " "
Less than 100 lbs. in one order	25c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 23½c. per lb.
Seamless Copper Tubing, 26c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
31½	30½	25½	24½	23½	23½	23½	23½	23½	23½	23½	24½	25½	27½	29½	30½

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1⅝ inch	45	48
2 inch	56	60

Discount, 27½%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	23½c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	20c.	" "
" " " " Rectangular sheets other than Sheathing	22½c.	" "
" " " " Rod	20c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 31⅞c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

NOTE.—Owing to shortage of tin suitable for britannia and sheet tin prices will be quoted only on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30	25.9	26c.	29c.
	3-30	26.9	27c.	30c.
21 to 24 inclusive	30-48	28.9	29c.	32c.
	48-60	31.9	32c.	35c.
25 to 26	3-30	27.9	28c.	31c.
	30-48	29.9	30c.	33c.
27	3-30	28.9	29c.	32c.
	30-48	31.9	32c.	35c.
28	3-30	29.9	30c.	33c.
	30-48	32.9	33c.	36c.
29	3-30	30.9	31c.	34c.
	30-48	34.9	35c.	38c.
30	3-30	31.9	32c.	35c.

The above prices refer to lengths between 2 and 8 feet. **Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.**

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 22 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	45	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Price per lb. over 25 lbs., Diameter, B. & S. Gauge, No. 000 to 10 and 12, 26 cents. No. 12 to 20 inch, 28 cents.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	26½c.	10%	30¼c.
8%	28c.	18%	30¾c.
10%	28½c.	20%	33c.
12%	29½c.	25%	40¾c.
15%	30c.	30%	46½c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	27½c.	15%	34c.
8%	29c.	16%	35c.
10%	30½c.	18%	36¾c.
12%	32½c.	30%	52c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.